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| Stuart, C. A. | ... | ... | ... | ... | ...Bombay |
| Stuart, M. Scott | ... | ... | ... | ... | ...Mhow |
| Sturt, Colonel | ... | ... | ... | ... | ...Europe |
| Sukhtankar, Sittaram Vishnu | ... | ... | ... | ... | ...Bombay |
| Surveyor, N. F. | ... | ... | ... | ... | ...Kurrachee |
| Swan, H. H. | ... | ... | ... | ... | ...Bombay |
| Swayne, H. G. E. (R. E.) | ... | ... | ... | ... | ...Aden |
| Swinhoe, Colonel C. (F.Z.S., F.L.S., F.E.S.) | ... | ... | ... | ... | ...Poona |
| Sykes, C. | ... | ... | ... | ... | ...Cutch Mandvi |
| Symington, J. H. | ... | ... | ... | ... | ...Bombay |
| Symons, J. L. | ... | ... | ... | ... | ...Bombay |
| Symons, H. S. | ... | ... | ... | ... | ...Bombay |
| Symons, N. S. | ... | ... | ... | ... | ...Bombay |
| Taylor, Chas. | ... | ... | ... | ... | ...Bombay. |
| Taylor, W. C. | ... | ... | ... | ... | ...Bombay |
| Terry, G. W. | ... | ... | ... | ... | ...Bombay |
| Temulji, Dr. B. N. | ... | ... | ... | ... | ...Bombay |

| NAME. | | | | | RESIDENCE. |
|--------------------------------|-----|-----|-----|-----|----------------|
| Thacker, W. | ... | ... | ... | ... | ...Bombay |
| Thakur Shripad Babaji (c. s.). | ... | ... | ... | ... | ...Broach |
| Twemlow Col. (R. E.) | ... | ... | ... | ... | ...Bombay |
| Thomson, Mrs. | ... | ... | ... | ... | ...Bombay |
| Tod, J. | ... | ... | ... | ... | ...Bombay |
| Turner, Mrs. A. F. | ... | ... | ... | ... | ...Bombay |
| Turner, Montague C. | ... | ... | ... | ... | ...Bombay |
| Thom, E. | ... | ... | ... | ... | ...Bombay |
| Thompson, B. W. O. | ... | ... | ... | ... | ...Ahmednugger |
| | | | | | |
| Vidal, G. W. (c.s.) | ... | ... | ... | ... | ...Tanna |
| | | | | | |
| Walcott, Colonel (C.B.) | ... | ... | ... | ... | ...Europe |
| Walker, A. C. | ... | ... | ... | ... | ...Bombay |
| Walker, T. | ... | ... | ... | ... | ...Bombay |
| Whyte, Lt. C. F. | ... | ... | ... | ... | ...Mhow |
| Willis, R. A. | ... | ... | ... | ... | ...Bombay |
| Wallace, James | ... | ... | ... | ... | ...Europe |
| Wallace, John | ... | ... | ... | ... | ...Bombay |
| Wallace, L. A. | ... | ... | ... | ... | ...Bombay |
| Walton, Rienzi (c.E.) | ... | ... | ... | ... | ...Europe |
| Walton, E. M. | ... | ... | ... | ... | ...Bombay |
| Ward, Frank | ... | ... | ... | ... | ...Bombay |
| Ward, H. B. | ... | ... | ... | ... | ...Bombay |
| Webb, W. | ... | ... | ... | ... | ...Bombay |
| Weir, Dr. T. S. | ... | ... | ... | ... | ...Bombay |
| Wenden, H. (c.E.) | ... | ... | ... | ... | ...Poona |
| Westmacott, Col. | ... | ... | ... | ... | ...Poona |
| Wise, Col. | ... | ... | ... | ... | ...Poona |
| Wise, H. S. | ... | ... | ... | ... | ...Bombay |
| Woodward, W. (c.s.) | ... | ... | ... | ... | ...Nasik |
| Wroughton, R. C. | ... | ... | ... | ... | ...Europe |
| Wylie, R. | ... | ... | ... | ... | ...Gadechi |
| | | | | | |
| Yerbury, Major | ... | ... | ... | ... | ...Europe |
| Young, G. S. | ... | ... | ... | ... | ...Europe |
| Young, W. E. | ... | ... | ... | ... | ...Bombay |

JOURNAL
OF THE
BOMBAY
Natural History Society.

No. 1.] BOMBAY, JANUARY 1886. [Vol. III.

WATERS OF WESTERN INDIA.

PART V.—SIND.

(By a Member of the Society.)

THE first and most important point as regards the higher vertebrates is that Sind is only a sub-tropical country, and the aquatic birds, in particular, belong largely to the Palæarctic fauna.

Secondly, we have not here a great river receiving affluents, but one which discharges distributaries, so that spawning fish pushing up stream do not here leave the Indus, but come to it.

Thirdly, we have to deal with a rainfall so small and uncertain that it is a negligible quantity. Some researches in which the present writer was concerned went far to support a theory conceived by the chief of Indian meteorologists, *viz.*, that Upper Sind receives no rain from the sea, but only gets its own evaporation partly returned in occasional showers. It is certain that the rainfall has greatly diminished since powerful and settled governments took the bridling of the Indus in hand, and prevented it from forming annually a shallow sea, with vast evaporation. My own opinion is that the ancient river will one day re-assert its sway, and that one of the most fearful catastrophes ever felt by any country will leave what we

now call Upper Sind a desert, and make Sibi, or some place thereabouts, the freshwater port of Central Asia.

But up to the present the biped has the best of it, though the tension and vicissitudes of the struggle can only be appreciated by those who have been in it. On this head I need only sum up by saying that the Indus, in Upper Sind, flows down a channel in the centre of a ridge, which ridge itself runs down the left, or eastern side of a wide shallow trough, and is continually trying, like all waters flowing at an angle to the Equator in the northern hemisphere, to shift its channel to the right or western side. On the eastern side the pressure is less; and the area below river level, population and cultivation are far inferior. But even here much land is lower than the flood level, and accordingly we have in Upper Sind two unequal populations dependent for their daily bread on getting a certain amount of Indus water, and for bare existence as terrestrial beings on keeping out the surplus.

There are analogous cases in Holland, still more in Egypt and Lombardy; but these are small areas in comparison, and moreover are much more thickly-populated, so that they have stronger means of resistance to the powers of the waters. If the tremendous energy of the "pax Britannica" is allowed to hold head against the Indus for a few more centuries, it may accumulate a population as numerous, and as well able to fight the river as those who dwell by the Nile or the Po.

In the meanwhile a single campaign interrupting the engineers might at any time bring about the cataclysm. It is perhaps permissible to conclude this sketch by observing that although the Sindi cultivator is very far below the Dutch peasant in every respect, he has no cause to envy the wretched labourers of Northern Italy, and still less so as regards the fellaheen of Egypt *servi servorum*.

Of all agricultural classes in this presidency, the Sindi cultivators are the best fed and most independent. They get meat, most of them, once or more a week, plenty of good fish, which concerns our subject, and dairy produce. If they don't like one landlord, as land is more abundant than hands, they can choose another at their pleasure; their stature and bearing show all this, in Upper Sind at least. The human animal, at any rate, can thrive in the plain of the Indus, and if its climate is to strangers simply infernal, the natives are used to it, and know no better. In dealing with any other country these details would be irrelevant; but in Sind all animals, and

especially man, live upon the Indus, and are justly termed aquatics from the Commissioner and the General down to the last Bhang and Mohana.

The Indus, as abovementioned, has in Sind no affluents but distributaries. Near the coast these become mouths, things common enough with great rivers. But higher up they are canals under human control, or "lets," that is natural and uncontrolled overflows. Those hollows, in which, after the subsidence of the snow-fed inundation, water still remains, are called "Dhands" (arms) and "Kolabs" (deep waters), and all of these swarm with life.

The highest aquatic mammal after *Homo sapiens*, is the Otter (*Lutra nair*). It is rather a puzzle with the otters that the same species seems to vary greatly in size with locality. The otter of Sind is nearly as big again as that of our peninsular provinces, but no larger than in Bengal or Malabar. But the same occurs in Europe. I once had an admittedly large specimen weighed on a particular river in Ireland, and it turned the scale at 16lbs. avoirdupois. But weights exceeding 20lbs are common in the British Isles, and you may see 25lbs. and 28lbs. recorded in the *Field* often enough. The lesson is that the genus *Lutra* and its species are subject to great local variation in this respect.

The next aquatic mammal is a very strange one, the Indus Porpoise, or "Bullan" (*Platanista gangetica*). I prefer to treat this remarkable animal as identical with the Gangetic species, because all I have to say will apply to either, and the specific distinction is very doubtful, consisting chiefly in the superior size of the few specimens obtained from the Indus. It is very difficult of capture, as are all the freshwater cetacea, and I myself exhausted money and influence in vain in the effort to obtain a specimen. A native chief is said to have been more fortunate, and to have applied his captive to a most extraordinary use.

The "Bullan" resembles the ordinary mammalian dolphins proper (not the *fish* wrongly so called) in general outline, having a fusiform body and long pointed snout, with teeth in both jaws. It differs from them in having little or no back fin, and from the common porpoise of Europe, and the *Steno* and *Neomeris* of our seas in having (as already mentioned) a long rostrum or beak-like snout. The same difference (with minor ones) distinguishes it from the nearest other freshwater cetacea; (*Orcella fluviatilis* of the Irrawady) and on the whole its nearest living relatives are supposed to be the *Hy-*

peroodon, a large whale of the North Atlantic, and *Inia*, a porpoise or dolphin of similar habits which is found in the great rivers of South America.

When we know more of those of China, it seems not unlikely that we may find something of the sort there.

It is by no means evenly distributed; indeed, nothing is on the Indus. Where there are towns, their rubbish and sewage probably attract fish; at any rate these and the "Bullans" are most common in such places. The water-fowl, on the other hand, are most common on undisturbed reaches, and the crocodilia are very locally distributed, whereof more anon. Some parts of the great river seem absolutely desert in every way.

Amongst aquatic birds the great Sarus Crane, essentially a tropical form, is rare. The White Siberian Crane (*Grus leucogeranus*) is recorded, in my opinion, very doubtfully, as a rare straggler from the north. The Grey Crane (*Grus cinerea*) is common enough in winter, but the Demoiselle Crane rare. We have here all the southern plovers, and the Chettusiæ are abundant, and the European Lapwing occurs pretty frequently. *Esacus recurvirostris* is said to be known as the "Chota Talûr" or "small sort of Houbara" (*Otis macqueeni*), but this is probably the result of a confusion between it and *Edicnemus crepitans*, the Lesser Stone Plover or Bastard Florican, which certainly does bear that name, and deserves it by its habits, which the former bird does not. Two swallow plovers, *Glareola orientalis* and *torquata*, breed here, and *G. lactea* occurs in considerable numbers, and may breed. *Squatarola helvetica*, the Grey Plover proper, is abundant in places in the cold weather, chiefly on the sea shore, and so on throughout their tribe. We have all the black-and-white marine plovers, and probably most of them breed.

Of the Raptores (which might fairly have claimed precedence), we have the White-tailed Sea-eagle, or Erne (*Haliaeetus albicilla*), the Grey-backed Sea Eagle, as on the Konkan coast (this latter breeds near Sakkar), and the Ring-tailed Sea Eagle, also breeding. This last bird has one old-established eyrie in a sacred pipal tree near Bori Bunder Railway station, where the birds do not seem to care twopence for the continual throng of men and noise and steam of the engines. The Osprey is common, and said to breed. *Spilornis cheela* is reported, but I have not seen it, and the Peregrine Falcon hunts ducks so constantly that it may almost be called a bird of the

waters. In Sind, at any rate, its haunt is always near water. *Circæetus gallicus* is reported; I have not seen it.

The Harriers abound, especially the Marsh Harrier. This, a large Buzzard, and the Dwarf Eagle frequent marshy ground and the edge of water. Mr. Hume has recorded his *Milvus major* and the Grey Kite (*Elanus coeruleus*), occurs on the Indus; the Brahminy Kite is pretty common, and breeds, and so does the Fish Owl (*Ketupa ceylonensis*). The aquatic raptores, it will be observed, retain a strong tropical element, though, on the whole, the Palæarctic forms slightly predominate, and are by far the most noticeable.

Of Kingfishers we have one northern species, the European Kingfisher, *Alcedo ispida*, said to breed; and one tropical, *Alcedo bengalensis*, which it is said does not. *Halcyon smyrnensis* and *Ceryle rudis*, both of which breed in Sind, are sub-tropical forms extending from the Mediterranean to the Equator. I knew a kingfisher to breed in a suspended grass-woven nest, probably originally the work of a Ploceus or allied bird, in the bank of a canal near Shikarpur. I supposed the bird to be *A. bengalensis*, but it was probably *A. ispida*. We have here none of the Malayan forms like *Ceyx*, or even *Pelargopsis*.

Amongst Storks, Sind possesses the great Adjutant, the Jabiru (*Mycteria australis*), the true Black Stork, more frequent here than in our former provinces, but only a winter visitor; the Black White-necked Stork, a resident, and the European Stork, abundant in the cold weather only. The Grey and Grass (Purple) Herons abound, with several species of White Egrets and Dwarf Herons, Night Herons, and Paddy-birds innumerable. Nearly all breed here. The European bittern is not very rare in the cold weather; and of dwarf bitterns, *Ardetta flavicollis*, *cinnamomea*, *sinensis* and *minuta* occur, and probably all breed. The first and last certainly do.

The Spoon-bill is common in the cold weather. I do not think it breeds here; but the Pelican Ibis, Shell Ibis, White, Black, and Glossy Ibises all do, especially in the marshes and islands of what is called the Eastern Narra, now the uppermost branch of the Indus on its left bank, draining off towards the Great Desert, east of the Ghar Hills.

In Sind, the Snipes and their allies are all of northern types, with one exception, the Painted Snipe, which breeds here. The Woodcock is not recorded from Sind. Of the Parrinæ we have the Water-Pheasant (*Hydrophasianus chirurgus*), which is resident, but

not the more tropical Bronze-winged Jacana. Amongst *Gallinulinea* the Purple and Bald Coots are abundant, the latter especially occurring locally in flocks of many hundred birds. The Watercock (*Gallicrex*), unknown in our Peninsular provinces, is found here. I do not know whether it breeds, but this is likely. The Waterhen and Crakes are numerous, but not peculiar, except *Porzana minuta*, an outlier from the Upper Asian region.

Passing on to the swimming birds proper, the sub-tropical character of the Avifauna becomes still more marked. Swans, probably *Cygnus olor*, have been seen and shot. The Flamingo is common, going somewhere north to breed in June, and returning in September. The Grey Lag Goose is locally abundant in winter, and the Barred-headed Goose, *Anser indicus*, not much less so; and *Anser albifrons*, a decidedly Palæarctic bird, occurs. The tropical Black-backed Goose is only found as a straggler. The Small Whistling Teal, however, abounds and breeds, and is commonly known by the quaint name of "Inundation Duck," as if it were a distinction amongst ducks to thrive upon inundations. I doubt whether the larger and less common Great Whistling Teal, *Dendrocygna fulva*, breeds here. The Brahminy Duck or Ruddy Sheldrake is common enough, but not resident; the true Sheldrake, a sub-arctic bird, is an uncommon cold-weather visitor. It has, I think, no breeding places in any climate warmer than that of England.

The first and most important true duck is the typical and essentially northern Mallard, which abounds in the cold weather. With it come the Shoveller, Gadwall, Pintail, and Widgeon, the Red-headed, Red-crested, White-eyed, and Tufted Pochards, all in great numbers. The sub-tropical Marbled Teal, rare in Gujarat and unknown almost in the rest of this Presidency, is a common cold weather visitor here. Its nearest relatives are not the teals, but the gadwalls.

The Spot-billed Duck is a resident, the Golden Eye and Scaup are rare cold weather visitors, so are the Red-breasted Merganser, the Goosander, and the Smew. The Tropic birds and a Gannet (our old friend *Sula cyanops*) occur on the coast, but cannot be said to frequent it.

The White Pelicans, more or less, are cold weather visitors, and the Grey Pelican is a resident, all occurring in considerable numbers (allowing for the great size and voracity of these birds).

They are tamed, or rather confined, by the fishermen of the Indus, who eat them and make oil of their fat.

The European, Chinese, and Little Cormorants abound, and all three are said to breed in Sind. As regards the first-named, this seems to require further examination.

The Snake Bird undoubtedly abounds and breeds here.

Of true Teals, the Grey and Garganey ("blue-winged") Teal are common in winter, and the Siberian *Querquedula formosa* (or *glocitans*) has been obtained.

The essentially tropical Cotton Teal (which is not a teal at all, but a dwarf goose) does not, I think, occur in Sind. I have one report of the Bengali Pink-headed Duck occurring as a straggler, but it cannot yet be called a recorded species.

The universal Dabchick is common, and the Crested and Black-necked Gulls occur, the latter especially near the mouths of the Indus.

Of Seafowl proper we have one, Petrel, *Oceanites oceanica*, and a shear water, *Puffinus persicus*. The gulls and terns are abundant, much more so than in the Konkan region, and, as might be expected, show a strong northern element. The strange Skimmer (*Rhynchops*) is locally abundant on the Indus.

REPTILES.

Amongst the Chelonia, or tortoises and turtles, Sind offers nothing new worth noticing in such a paper as this, except that (as might be expected) the aquatic species are more developed in the Indus than they commonly are in the lesser fresh waters hitherto noticed. In suitable places, and especially near such large towns as Sakkar, where food is abundant, they reach dimensions at which an alderman need not sneeze. Of tortoises there are two species of *Pangshura*, with 5 claws on the fore feet and 4 behind, *P. tentoria* and *smithii*. Neither reaches a foot long, as hitherto observed. Of *Batagur* there are three species—*Dhongoka*, *Baska*, *Thargi*—all with the same unguiculation, but approaching or reaching 2 feet in length, a great size for an aquatic tortoise.

Of turtles we have the small *Emydla granosa*, seldom attaining to a foot in length, *Trionyx gangeticus* and *Chitra indica*, of which the last-named attains three feet long, and the former two, and probably both measurements are often much exceeded. The marine turtles of Sind are *Chelonia virgata*, the Indian Green Turtle, and *Cawana olivacea*, and enough has been said of them before.

In the next group, however, we come on an important novelty. *Crocodylus porosus* does not seem to have been identified here. C.

palustris is locally abundant, and I need waste no words on the oft-told tale of its ugly sanctuary and disgusting rites near Karachi. But we find here a new reptile quite out of place in this half-western land.

This is the Gavial, or Gharyal, or fishing crocodile (*Gavialis gangeticus*), characterized by its dentition and long snout, resembling to some extent those of the garfishes, and particularly suited to the capture of fish, and certain modifications of the nostrils, enabling it to remain for a very long time under water. It is, moreover, much less active on the shore than the broad-snouted crocodiles proper, and is seldom accused of the murder of terrestrial mammals in the shallows, or on the beach. This curious creature has its head-quarters in the great rivers which debouch into the head of the Bay of Bengal; and one allied genus (*Tomistoma* or *Rhynchosuchus*) extends at least as far east as Borneo. It has no representative in the New World, whose alligators indeed show a form rather less purely aquatic than that of our crocodiles proper, the limbs being less fin-like. Only one Old World alligator has been reported, a rare Chinese species. Three species of Monitors (*Varanus* and *Psammosaurus*) are found, often in considerable numbers, especially the common "Ghorpur" (*Sindice*, *Goh*), which used to trouble much in Shikarpur by invading a poultry-yard carefully fenced against all other intruders. Smooth mud walls, hard as stone, defied rats and snakes, while cats and raptorial birds were excluded by a strong net covering the whole enclosure. But the "Gohs" climbed the wall, worked through the net, and played Old Harry with eggs and young birds. One comfort was that they were not able to do much in the gymnastic way when gorged; and usually paid for the night's meal by the penalty of "infang thief" in the morning. I have not myself had occasion to note anything particular about the freshwater snakes of Sind, and the *Amphibia* (which in common parlance we class with reptiles) present no peculiarity worth noticing here. Mr. Murray notices no special genera of either, and only a few new species, a sea-snake, a toad and a frog.

The Fishes, too, belong mostly to genera and species already noticed, but there are some points about their distribution and habits worthy of attention.

The typical Mahseer, *Barbus tor*, which perhaps does not occur in any other west-flowing waters of this Presidency, is certainly an inhabitant of the Indus, although, within our boundary, that

river does not afford the alternation of rocky rapids and deep reaches ; wherein the Barrajute and its other favourite streams abound.

The small but sporting "Mahseer," which is found in the hill streams of the western border, is probably not specifically identical. Indeed, I have reason to suspect that there are several species, but I have not fished those waters myself, nor have I any specimens to go on. I do not think that any *Oreinus* (mountain barbel) has yet been identified in Sind. But a careful and keen-eyed observer, who unfortunately was not an ichthyologist, reported "an unmistakable trout" to me, as occurring in a stream on the east slope of the Kirthar Range, above the Mehar and Larkhana country. It seems probable that these may have been *Oreini* of the type known further north as "Himalayan trout."

Without specimens before him, no testimony yet available will justify a naturalist in accepting an Indian species of *Salmo*.

Amongst the *Labeos* we find again an old acquaintance, *Labeo rohita*, which we parted with in the great east-flowing rivers of the Deccan plateau.

Here it is abundant, under the name of "Dumbro," and ranks in the fish-trade of Sind second only to the "Palla," whereof more anon. In towns remote from the Indus it is the principal fresh fish. The "Palla," like all Clupeidæ, dies shortly after capture, and rots soon after death ; and here it is confined to the main stream.

The "Dumbro," on the other hand, bears confinement in water well ; and, even when dead, stands some time and transport.

One of the chief "Dumbro" fisheries is at the head works of the Eastern Narra Canal, where what is called a "regulating bridge" (*i.e.* a bridge whose arches are sluices of a rough sort) forms a fall. I have already pointed out that the Indus, in Sind, has *distributaries* instead of *tributaries* (with the unimportant exception of what little water from the western Border hills may occasionally find its way in by the Aral).

A consequence of this is that when the annual inundation sets all large breeding fish on the run, their course up stream is towards the main river, not *from* it, as in waters turned right-side up, and so the "Dumbros" run up the Narra from their winter quarters in many a marsh and "kolab."

At these headworks they find the fall, and what is worse, a lot of nets hung before it in rectangular timber frames, and as they leap at the obstacle they fall back into the nets.

The fishermen, on taking them out, thread them *by the eyes*, with a huge iron needle, on a line whereof the end is made fast to a stake in the water; and, having so bestowed the morning's take, belay the needle-end of the line to another stake, and wait for their customers, who know well when and where to come. I have often seen 5 or 6 dozen of Dumbro, averaging well over a stone weight, many over 20 lbs., on such a line, and the first impulse of any civilized man is to put a violent end to such a cruelty.

The reasons why this cannot be done are matters of administration, and not of zoology.

To the end of my own time on those waters, I never could endure the sight of that line of blinded fish, but I am bound to admit that their gestures were not expressive of agony, and from what we know of the nervous system of fishes, it is probable that their sufferings are much less than a highly-organized mammal can conceive.

Indeed, even the inferior mammals, and especially the ruminants, seem to be gifted with a marvellous insensibility to torture, which any one who has seen in India the sacred bovine race under the hands of its worshippers, may well thank God for, if the poor brutes can't do it for themselves. This, however, is a digression.

I am informed, not very credibly, that the "Dumbros" can be caught in the Narra, below this bridge, "with flies, just like salmon." If this is true, the sport is probably the best rod-fishing in this Presidency.

Amongst catfishes the Pádi (*Wallago attu*) is much the finest and most palatable in the Indus, but the English name is usually given there to a much commoner species of *Rita*, called in Sind, "khaggo."

This fish is easily caught with hook and line, but little esteemed, because, though the flesh is good enough, there is very little of it after deducting a huge bony head and a lot of spines and fins. It expresses its disgust by an odd grunting noise, something like that of the European gurnet. This spelling, "gurnet" is now treated by English writers as inaccurate, and the right thing is supposed to be "gurnard" from the French "grogard," ("grunter" or "grumbler"). But all editions of Shakspeare (*I Henry IV.*, Act iv., scene 2,) have "soused gurnet," which was, apparently, in no better reputation in Falstaff's day than soured "khaggo" in Sind, and probably for the same reason, namely, that there is so little meat on the fish. The flavour, in each case, is as good as that of

many fish more highly reputed; but an old fisherman's joke is that "the flesh on a gurnet's head is all poison" (there being *none*), and our catfish is in the same case.

The murrells abound in some of the *kolabs*, and reach a great size. I had once an odd experience in shooting at one across a channel. The heavy bullet, driven by four drachms of powder, not only cut the fish's head off, but knocked the body clean out of the water on to the bank. He wasn't a *very* large fish, but there was enough of him for breakfast and dinner.

I never got an eel in Sind, but I heard of them, and no doubt they are there, only, as elsewhere in India, the local tackle is made up for other fish, and the eels escape it. If you want to catch eels in large quantities, you must fish for them with their own gear; except in the case of bottom fishing in some European waters, where they are apt to come unwished for, they might fairly say not quite nninvited.

But all these and many others are mere accidents and superfluities in Sind. When a man there talks of fish he means "Palla," as sure as a man using the same word on 'Tweed or Shannon means salmon.

The capture and distribution of this fish are the chief livelihood of some thousands of persons. To the remaining population of the province it is an important article of food, and, in short, the whole business is one of the great freshwater fisheries of the world. Here alone does the Government of Bombay make a serious revenue from fisheries, and that on this fish alone, or almost alone, claiming one-third of the produce or its equivalent. The great riparian jaghirdars do the same, and the claim is never disputed. Having premised so much, it is time to say something about the Palla himself, and the first thing to say is that the term "Salmon of the Indus" is a "chee-chee" abomination, not to be used amongst Christian men. I have said before of the mahseer that he was about as like a salmon as a buccaneer is like an officer of the Royal Navy. All four are pugnacious aquatic creatures, and that's all.

But when it comes to the poor Palla, the comparative mammal must not be a buccaneer, but the most timid coaster of the most timid nation, a Loochoo Islander perhaps, or an Otaheitan.

The Mahseer does, indeed, resemble a salmon in taking a fly, although, as he would rather take anything else, the resemblance stops there. But the poor Palla never thinks of hurting a fly or

anything else; he resembles the salmon in being anadromous and good to eat, and that's all. He is in fact the Indian Shad.

The English Shad or Allice is not a very common fish, and I believe is only important in the Severn. It is, however, worth while to notice the similarity of "Allice" and "Hilsa" or "ilisha," the Bengal name of the Palla. "*Alausa*" is a Latin name, but whethertaken from the West or the East does not appear. At any rate, the Shads are now properly classed as gigantic Sprats (*Clupea*), and our fish is *Clupea ilisha*, and is the most important of the breed in freshwater, except, perhaps, the Shad of the United States, which is also the subject of a great fishery.

The difference between Shads and other Sprats is—firstly, that they run up rivers to breed (are anadromous), and secondly, that they are the giants of the genus *Clupea*. I have not my Sind notes at hand, but can safely say that the Palla usually exceeds 3lbs., and very rarely 6lbs. in weight when in decent condition (fresh-run). But some have been weighed in my presence over 7lbs. just out of the water.

In that condition the flavour of the Palla is very much that of a fresh herring, but like all the tribe he decays rapidly. A really fresh Palla is one fish on the table, and one two hours caught in another. After six hours he is very often quite inadmissible *au naturel*. The Sindis, however, are great hands at salting, drying, and kippering him, and I remember with affection several ladies whom the customs of the country never permitted me to thank in person, but to whom I yet stand indebted for breakfasts that Donegal or Perthshire could not have beaten.

Finally I have, with regret, to say of the Palla that he is most sinfully bony, so that the anatomising of him in a manner to make him eatable is one of the fine arts of Sind, and that his roe, though well flavoured, is so dry as to require cent. per cent. of butter before you can swallow it.

So much for the Palla himself, but I should not have described the waters of Sind if I had not more to say about his capture, which depends upon methods showing an odd mixture of barbarous mechanical ignorance with a profound knowledge of one of the least commonly known secrets of nature.

In the snow-fed Indus, the upper water, warmed by the sun, always retains its place, and, as elsewhere, flows at a much higher rate of speed than the colder and silt-laden bottom-water. To the Palla

pushing up stream, this is obviously a good reason for swimming low; just as we, in the like case, choose the dead water under the bank.

The Sindi provides himself in the first instance with an Y-shaped pole over 20 feet long, and supplies the fork with netting, till he has something like an huge hideous landing net. Having next secured an "embarcation" (whereof I shall discuss the varieties hereafter), he launches himself on the Indus, and drifts down stream holding his net vertically. As he floats with the rapid surface-current, the resistance of the slow bottom-water makes his net bag up-stream, just as a steamer outstripping a light breeze leaves her smoky pennant behind her. Into the open mouth of this the Palla, pushing up with the crazy impulse of all spawning fish, runs headlong, and warns the fisherman of his presence by a chuck, as he strikes the pocket of the net. It is probable that he would hardly have sense enough to back out, but all trouble of considering the matter is spared him. On feeling the "chuck," the fisherman, with a sharp upward turn of his arms, causes the long purse of the net to turn once on itself, effectively twisting in the prisoner, and then shortens the shaft and net, hand over hand, till he can get his finger and thumb into the latter's gills, through which, if he has no boat, he straightway runs a needle and thread of the sort already described in treating of the "Dumbro." Some scrupulous Mussulmans are said to cut the Palla's throat with a knife, according to the formulas of the law. But I never saw this done myself; it is clearly unnecessary from a common-sense point of view in most cases; and the Sindi fishermen notoriously consider the gills as the result of a throat-cutting performed by the Prophet himself, to sanction to their usage even fish otherwise unclean (the large scale-less *Sibiridœa*). Under certain circumstances, presently to be noticed, there is another reason for the use of the knife.

The Palla fisher, when he has got to the bottom of his "cast" or drift, must get up to the top of it again, as best he can, and *de capo* to the end of his working day. His most famous and extraordinary craft is an earthen pot, and since the wise men of Gotham went to sea in a bowl, nothing quainter has been seen. The Palla-pot is a huge, lenticular-shaped, neckless and bottomless jar. By the last phrase I mean that, like many Indian pots, it has no bottom capable of holding it upright. This being launched, the fisherman balances himself on one shoulder of it, and floats down

as described. While he has only to hold the net upright, this is all fair sailing, but when it comes to getting in a fish, no Caucasian has ever made out how he maintains his balance, which is so ticklish that the knife must then really be brought in to quiet the fish before it is consigned to the hold of this queer ship. If he overlies the hole, a strange disaster befalls him. For even the top water of the Indus is cooler than the air in a pot that has been lying on its broiling shores, and the rapid contraction of the contained air on cooling will hermetically seal, for a time, the pot to the stomach of any one who allows himself to loll over its mouth. It is said that this disaster overtook the only European who ever dared to be skipper of a "Palla-pot," a mythical Major, whose vagaries are fast becoming good food for the folk-lorists and Solar legend hunters.

Where the drift is long, the ponderous pot would obviously be inconvenient on the return-trip, and in such places it is usually replaced by gourd floats, the needle and thread arrangement serving to secure the fish. But both of these vessels are most appropriate to the neighbourhood of markets for fresh fish.

Now there are long reaches of the Indus almost desolate (but for the Palla-fishers), and on these the fishery is conducted with a view to salting or drying the take. Here we have another ship, the "Palla-Dhundi" or "Shad-punt." The simple architecture of its hull is not very unlike that of a Thames punt. Over this, a few tamarisk poles and mats form a sort of spar-deck, under which the ship's company live by day, and over it they sleep at night, as in their atrocious climate every man seeks the slightest available elevation to sleep on, in the hope of getting whatever breeze may be stirring.

A "Palla-Dhundi" is a queer little Noah's ark. There will be in it one or two Mohánas (the fisher caste of Sind), their wives and children, a couple of goats, landed here and there to browse on the often desolate shore, a dog or two, and possibly a cat. It has probably a dozen outriggers, each of which, under favourable circumstances, sustains a half tame pelican or heron. The pelicans are eaten and their oil sold (as a native medicine). The herons are sold as subjects for falconry, which is a very living sport in Sind. It is said that both otters and cormorants are kept to help in the fishery, but I cannot now remember having seen either so used, though both are often caught by the Mohánas, who are great fowlers and hunters, as well as fishermen.

The women help to work the boat with an efficiency worthy of Black-eyed Susan, but it is said that they ought not, by rule, to catch fish, nor the men to trespass on their province of selling it. They are stalwart viragos, and stout asserters of women's rights, to an extent which shocks all good Mussalmans of Sind. The "Dhundis" generally work in great fleets, and assemble at riverside camps, which become fishing-ports for the time being, where their owners settle accounts with the contractors who have bought the fishery of each district from Government, or the great riparian landholders. The due of these is usually one-third of the take, and they generally purchase most of the rest, with much squabbling, stoppages of pay, frequent strikes, and an enormous amount of cheating in a sort of "Tommy shop" barter. However, *all* are pretty well matched, and cannot dispense with each other.

In any country but India, capital, law, and education (such as it is, *viz.*, knowing how to cast an account) would be too much for the operative. But the Mohána caste is a vast localized trade's union, and the contractor who could not come to some settlement with the fishermen of his own district would not be able to import others. The Mohána himself is troubled with no scruples, or rather his wife, who does the bargaining, is not, and so everything finds its level comfortably enough in the end.

In this sketch of the waters of Sind, I have omitted one of the most remarkable, the Manchar Lake, because enough has been said about it in this Journal by Captain Becher. I have, moreover, been somewhat more sketchy than usual in dealing with the superior vertebrates, but these have a local authority of their own, Mr. Murray, whose work is probably in the hands of all those working on the spot, and people at a distance want only the more striking outlines of such a matter. He has not, I think, yet published the part of that work relating to fishes, but it is not my business, in such rough notes as these, to forestall him; and the molluscs have been noticed in a paper in his own Magazine.

I might indeed have dwelt upon the rare Horse Marine and River Pirate, who occur (*me teste*) on the Indus, in the Khairpur State. But these animals, with the extinct Centaur and Sphynx, and the barely surviving Hesperian Gormagon, belong rather to the domain of the Anthropological Society.

There is, however, one very remarkable thing to be noticed in the zoology of the Indus, which may fitly be dealt with here.

My readers will have noticed that it contains one cetacean, one crocodilian, and one fish, which do not occur elsewhere in waters flowing into the Arabian Sea, but abound in those that meet the Bay of Bengal. These are *Platanista gangeticus*, *Gavialis gangeticus* and *Labeo rohita*.

The cetacean, like all other cetaceans, cannot land at all. The reptile is the most aquatic of all the crocodilia, and its movement ashore is confined to crawling on to a sand bank for a nap. The fish (a thing necessary to specify in India, where we have several fishes quite at home out of water), is a high Cyprinoid, and incapable of terrestrial movement. How did they get there?

The answer is in one of the strangest chapters of recent geology, known to Indian professors of that art as the "Legend of the Lost River."

Many of my readers know that the great and ancient rock formations of the Peninsular proper are separated from the loftier but more modern Himalayas, and Afghan and Belooch hills, by a great elbow-shaped plain, the west part of which forms the valley of the Indus and great Indian Desert; while the Eastern is the region of the Ganges and its tributaries. The former is mostly sand, and the latter mostly loam, but they melt into each other between the Jamna and the Satlej at an almost imperceptible watershed, nearly due south of the famous Siwalik Hills, and pretty well identified with the legendary land of Kurukshetra, the cockpit of all decisive Indian wars, from the time of the Mahabharat until a new element of battle arose out of the sea.

Here, all Indian legends say, flowed a sacred stream, the Saraswati, which joined the Jamna, and is still supposed, by a pious fiction, to do so at Prayaga or Allahabad. In that region the Saraswati is not now recognizable to the modern geographer. But about the doubtful watershed there are certain ancient channels that fill in time of great rain. And by the help of these, and of our modern knowledge of the laws that govern rivers, we can piece out the story of the Lost River.

It probably did originally join the Jamna, and drain into the Bay of Bengal. But being a river of the Northern Hemisphere, flowing at an angle to the Equator, it was bound (by laws which need not here be discussed in detail) to bear upon its right, or western bank, and probably did so until, in some year of mighty floods, it cut through the contemptible watershed, and turned its

waters westwards into the great drainage system of the Indus, *carrying with it its Bengali fauna*. The upper springs of the Saraswati, following the same law, have long since become those of what we now call the *Satlej*, and of the drainage channels of the plains of Kurukshetra, the greatest still turns westwards, and its overflow is absorbed in the Great Desert, or, if it gets into the sea at all, does so by the Indus drainage system. It must be remembered that, at the remote semi-historical age spoken of, the *Satlej* itself, and all the other rivers of that system, must have flowed far east of their present course.

There is nothing new in the hypothesis advanced. Peter the Great's Scotch surveyor found the Oxus flowing into the Caspian, which now flows into the Aral, though the old channel was rediscovered by the expeditions of Peter's last descendant. The westward movement of the Indus itself is graven on the rocks with more than an iron pen, beside the ruins of Alor, and is indeed matter of almost modern history.

KESWAL.

NOTES ON A COLLECTION OF BUTTERFLIES MADE
IN BURMAH BETWEEN SEPTEMBER 1885 AND
DECEMBER 1886.

BY LIEUT. E. Y. WATSON.

COMMUNICATED BY JAMES A. MURRAY, *Vict. Nat. Hist. Inst.*

THE butterflies in the following list were caught at Rangoon from September to December 1885, and again from May to September 1886, at Beeling, Upper Tenasserim, from January to April 1886; and at Pougadaw, Upper Burmah, during October and November 1886.

The majority of specimens were caught in the pineapple gardens at Rangoon. These gardens, which extend for three or four miles from Rangoon on either side of the Prome Road, contain a considerable amount of low scrub jungle, interspersed with trees, chiefly jack-fruit, and abound in butterflies, especially *Hesperiidæ*.

Beeling is a village about sixty miles to the north of Moulmein. Here the jungle consists largely of bamboo, with a fair proportion of large trees. The butterflies caught comprise a considerable number of comparatively rare species, and some which, to the best of my knowledge, are as yet undescribed. The most prolific collecting

grounds were the beds of the small mountain streams, especially at the higher elevations.

Poungadow is a small village just across the old frontier, and about thirty miles to the north-west of Thayetmyo. Here the jungle consists almost entirely of low bushes, very inferior to either Rangoon or Beeling from a butterfly point of view, though owing to the difference in rainfall, several species occurred which were not obtained elsewhere.

In the following notes, where no remark is placed against a species, it may be presumed it occurs commonly at all three places, and where any one place is omitted, it is intended to imply that the species did not occur there to my knowledge :—

1. *Danaïs vulgaris*, Butler.

Common at Beeling; occurs at Rangoon but rarely.

2. *D. limniace*, Cramer.

3. *D. aglæa*, Cramer.

4. *D. aglæoides*, Felder.

Males common at Rangoon and Beeling; females rare.

5. *D. gautama*, Moore.

One male. Beeling.

6. *D. septemtrionis*, Butler.

Beeling, but not common.

7. *D. chrysippus*, Linnæus.

8. *D. genutia*, Cramer.

9. *D. hegesippus*, Cramer.

Common at Rangoon; not seen elsewhere.

10. *Euplœa rogenkoferi*, Felder.

One male, Beeling.

11. *Euplœa margarita*, Butler.

Occurs rarely at Rangoon and Beeling.

12. *Euplœa crassa*, Butler.

One female at Beeling.

13. *Euplœa erichsonii*, Felder.

Common at Beeling; rare in Rangoon.

14. *E. rhadamanthus*, Fabricius.

Not uncommon at Beeling; females rare.

15. *E. castlemanni*, Felder.

One specimen seen in Rangoon flying among the tree-tops. Three or four Rangoon caught specimens in the Museum at Rangoon.

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16. *E. midamus*, Linnæus.
 17. *E. modesta*, Butler.
One male at Beeling.
 18. *E. godartii*, Lucas.
 19. *E. subdita*, Moore.
One male, Beeling.
 20. *E. alcatheæ*, Godt.
Moderately common, Beeliug.
 21. *E. limborgii*, Moore.
Rare at Beeliug.
 22. *E. grotei*, Felder.
One male, one female, Beeling.
 23. *E. hopei*, Felder.
Beeling, one male.
 24. *Mycalesus anaxioides*, Marshall.
Beeling, rare.
 25. *M. medus*, Fabricius.
 26. *M. runeka*, Moore.
 27. *M. blasius*, Fabricius.
 28. *M. mineus*, Linnæus.
 29. *M. perseus*, Fabricius.
 30. *M. malsara*, Moore.
Rangoon and Beeling, common.
 31. *Lethe mekara*, Moore.
Two males, one female, Beeling.
 32. *L. europa*, Fabricius.
 33. *L. rohria*, Fabricius.
Beeling, not common.
 34. *Zophaessa*, sp.
Poungadaw one specimen, very much battered, probably
Z. yama, Moore.
 35. *Ypthima philomela*, Johansen.
 36. *Y. avanta*, Moore.
Beeling, one male.
 37. *Y. huebneri*, Kirby.
 38. *Erites angularis*, Moore.
Beeling, not uncommon at moderate altitudes, but very
difficult to catch, as it is only found in thick bamboo
jungle. I found the best plan to have them driven
towards me.

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39. *Melanitis leda*, Linnæus.
40. *M. aswa*, Moore.
41. *M. bela* Moore.
Beeling, not common.
42. *M. ismene*, Cramer.
43. *Elymnias undularis*, Drury.
Beeling, common. Rangoon, rarely.
44. *E. leucocyma*, Godt.
Beeling, one male, one female.
Poungadow, one female.
45. *Dyctis vasudeva*, Moore.
Beeling, one specimen.
46. *Discophora tullia*, Cramer.
47. *Ergolis merione*, Cramer.
48. *E. ariadne*, Linnæus.
49. *Euripus halitherses*, Doubleday. Hewitson.
Beeling, one female.
50. *Cupha erymanthis*, Drury.
51. *Atella sinha*, Kollar.
Beeling, a few specimens.
52. *A. phalanta*, Drury.
53. *A. alcippe*, Cramer.
Beeling, not uncommon.
54. *Cethosia cyane*, Drury.
Beeling, Rangoon, common.
55. *Cethosia biblis*, Drury.
Beeling, common.
56. *Cynthia erota*, Fabricius.
Beeling, one female.
57. *Precis iphita*, Cramer.
58. *Junonia asterie*, Linnæus.
59. *J. almana*, Linnæus.
60. *J. atlites*, Linnæus.
61. *J. lemonias*, Linnæus.
62. *J. hierta*, Moschler.
63. *J. orithya*, Linnæus.
64. *Neptis hordonia*, Stoll.
65. *Neptis plagiosa*, Moore.
Beeling, common.
66. *Neptis varmona*, Moore.

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67. *Neptis kamarupa*, Moore.
Rangoon. Beeling, not uncommon.
68. *Neptis adipala*, Moore.
Beeling, one specimen.
69. *Neptis ophiana*, Moore.
Beeling, a few specimens.
70. *Neptis martabana*, Moore.
Poungadaw, one specimen.
71. *Neptis jumba*, Moore.
72. *Cirrhochroa mithila*, Moore.
Beeling, not uncommon. Occurs rarely at
Rangoon.
73. *Hypolimnias bolina*, Linnæus.
Common everywhere. *H. missipus* not seen.
74. *Penthema darlisa*, Moore.
Beeling, one specimen.
75. *Parthenos gambriseus*, Fabricius.
Var. *apicalis* not uncommon, Rangoon and Beeling.
76. *Lebadea attenuata*, Moore.
Beeling, common.
77. *Limenitus procris*. Cramer.
Rangoon, Poungadaw, common.
78. *Athyma inarina*, Butler.
Rangoon, one specimen, female.
79. *Athyma perius*, Linnæus.
80. *Athyma krisna*, Moore.
Poungadaw, one specimen.
81. *Symphædra dirtæa*, Fabricius.
Poungadaw, common.
82. *Euthalia lepidea*, Butler.
Rangoon, Beeling, common.
83. *Euthalia xiphiones*, Butler.
Beeling, one female.
84. *Euthalia gahnu*, Moore.
85. *Euthalia kesava*, Moore.
Rangoon, Beeling, common.
86. *Euthalia discispilota*, Moore.
Beeling, a few specimens.
87. *Euthalia garuda*, Moore.
Rangoon, Beeling, common.

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88. *Euthalia lubentina*, Cramer.
Rangoon, not common.
89. *Euthalia anosia*, Moore.
Beeling, one female.
90. *Rhinopalpa vasuki*, Doherty.
Beeling, two specimens.
91. *Cyrestis nivea*, Linken-sommer.
Beeling, common.
92. *Cyrestis risa*, Doubleday, Hewitson.
93. *Kallima inachis*, Boisduval.
Beeling and Pougadaw rarely.
94. *Charaxes athamas*, Drury.
95. *Zemeros flegyas*, Cramer.
Rangoon and Beeling, common.
96. *Abisara angulata*, Moore.
Beeling, not uncommon.
97. *Curetis* sp.
Common, Rangoon, Beeling.
98. *Gerydus biggsii*, Distant.
One specimen, Beeling.
99. *Paragerydus boisduvalii*, Butler.
Common, Pougadaw, Beeling.
100. *Paragerydus* sp.
One specimen, Rangoon.
101. *Allotinus unicolor*, Felder.
Very common at Rangoon.
102. *Spalgis epius*, Westwood. { Common,
103. *Neopithecops zelmora*, Butler. { Rangoon, Beeling.
104. *Cyaniris placida*, Moore.
Beeling.
105. *C. transpectus*, Beeling.
106. *Chilades varunasia*, Moore.
107. *C. laius*, Cramer.
108. *C. putli*, Kollar.
109. *Chilades* sp.
Pougadaw.
110. *Castalius rosimon*, Fabricius.
Rangoon, Beeling.
111. *C. ethion*. { Rangoon, Beeling.
112. *C. rocus*, Godt. { Pougadaw, not common.

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113. *O. elna*, Hewitson.
Poungadaw.
114. *Castalius* sp.
Rangoon.
115. *Zizera karsandra*, Moore.
116. *Z. pygmaea*, Snelein.
117. *Z. sangra*, Moore.
118. *Nacaduba ardates*, Moore.
119. *N. coelestis*,
Beeling.
120. *N. kerriana*, Distant
Beeling, one specimen.
121. *Nacaduba* sp.
Beeling.
122. *Nacaduba* sp.
Rangoon, Beeling.
123. *Nacaduba* sp.
Rangoon, Beeling.
124. *Nacaduba* sp.

Near Beeling.
125. *Jamides bochus*, Cramer
Rangoon, Beeling, not common.
126. *Catochrysops*,
127. *Catochrysops strabo*, Fab.
128. *Lampides ælianus*, Fab.
130. *Lampides elpis*, Godt.
131. *Lampides* sp., Beeling, not common.
132. *Polyommatus boeticus*, Linn.
133. *Megisba mahya*.
Beeling.
134. *Lycaenestes* sp.
Rangoon and Beeling, rare.
135. *Darasana paramuta*.
Rangoon, one specimen.
136. *Horaga sikkima*,
137. *Horaga* sp.
Common.
138. *Horaga lisides*.
Beeling, one specimen.
139. *Myrina lapithis*, Moore.

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140. *Spindasis lohita*, Horsf.
Rangoon, Beeling, common.
141. *Spindasis* sp.
Poungadaw, one specimen.
142. *Satadra ælea*
Rangoon, rare.
143. *Tajuria mantra*, Feld.
Beeling, one specimen.
144. *Tajuria* sp. (*longinus*?)
Poungadaw, one specimen.
145. *Iolaus anysis*,
Beeling, one specimen.
146. *Cheritra jaffra*. Horsf.
Rangoon, Beeling, common
147. *Sithon jangala*.
Pegu, Rangoon, common.
148. *Hypolycaena etolus*, Fabr.
Beeling, rare.
149. *Nilasera centaurius*, Fabr.
Rangoon, Beeling, common.
150. *Narathura ameria*, Hew.
Beeling, a few specimens only.
151. *Narathura* sp.
Beeling, rare.
152. *Narathura*, sp.
Beeling, rare.
153. *Surandra quercitorum*, Moore.
Rangoon, not uncommon.
154. *Rapala orseis*, Hewitson.
Rangoon, a few specimens.
155. *Rapala schistacea*, Moore.
Rangoon, Beeling, a few only.
156. *Rapala amisena*, Hewitson.
Rangoon, two specimens.
157. *Rapala* sp.
Rangoon, not uncommon, but local.
158. *Baspa melampus*, Cramer.
159. *Vadebra petosiris*, Butler.
Rangoon, Poungadaw.
160. *Loxura atymnus*, Cramer.

161. *Thamala miniata*.
Beeling, rare.
162. *Nychitona xiphia*, Fabr.
163. *Delias hierta* (var *in'ica*), Hubner.
164. *Delias agostina*, Hewitson.
Common at Beeling and Pougadaw.
165. *Delias pasithæ*, Linnæus.
Common at Beeling.
166. *Catopsilia catilla*, Cramer.
167. *Catopsilia crocale*, Cramer.
168. *Catopsilia pyranthe*, Linnæus.
169. *Terias hecabe*, Linnæus.
170. *Terias sari*, Horsfield.
171. *Terias harina*, Horsfield.
Common at Beeling, occurs at Rangoon.
172. *Terias* sp.
Beeling, rare.
173. *Terias*, sp.
Rangoon, one specimen.
174. *Terias*, sp.
Beeling, common.
175. *Terias*, sp.
Pougadaw, common.
176. *Terias læta*, Boisduval.
Only seen once on the Sittang river
in N. Tenasserim.
177. *Ixias pyrene*, Linnæus.
178. *Ixias* sp.
Beeling, common.
179. *Catophaga hippoides*.
Rangoon, Beeling, common.
180. *Catophaga*, sp.
Beeling, rare.
181. *Appias libythea*, Fabr.
Beeling, rare.
182. *Huphina phrynne*, Fabricius.
Common.
183. *Huphina lea*, Doubl.
Rangoon, a few specimens.
184. *Huphina* sp. Pougadaw, common.

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185. *Huphina* sp.
Poungadaw, common.
186. *Pieris soracta*,
Rangoon, Beeling, not common.
187. *Hebomoia glaucippe*, Linnæus
188. *Nepheronea gæa*, Felder.
189. *Ornithoptera pompeus*, Cramer.
Common at Beeling and Poungadaw.
190. *Papilio antiphates*, Cramer.
Beeling, common.
191. *Papilio sarpedon*, Linnæus.
Beeling.
192. *Papilio eurypylus*, Linnæus.
Beeling, common
193. *Papilio agamemnon*, Linn.
194. *Papilio erithonius*, Cramer.
195. *Papilio helenus*, Linnæus
Rangoon, rare.
196. *Papilio pammon*, Linnæus.
197. *Papilio doubledayi*, Wallace.
Rangoon. Beeling common,
198. *P. aristolochia*, Fabricius.
199. *P. androgeus*, Cramer.
Rangoon, Beeling, common.
200. *P. panope*, Linnæus.
Rangoon, Beeling, common.
201. *P. dissimilis*, Linnæus.
Rangoon, Beeling, common.
202. *Papilo* sp.
Beeling, a few specimens.
203. *Leptocircus virens*.
Beeling, common.
204. *Badamia exclamationis*, Fabr.
205. *Choaspes harisa*, Moore.
Rangoon, Beeling, common.
206. *Hasora badra*, Moore.
Rangoon, common.
207. *Hasora chromus*, Cramer.
Rangoon, rare.
208. *Paduka glandulosa*, Distant. Beeling, one specimen.

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209. *Matapa aria*, Moore
210. *Pithauria murdava*, Moore.
Beeling, a few.
211. *Chapra matthias*, Fabr.
212. *Chapra* sp.
213. *Parnara semamora*, Moore.
Beeling, rare.
214. *Parnara austeni*.
Rangoon, common.
215. *Parnara* sp.
Poungadaw, rare.
216. *Parnara* sp.
Rangoon, common.
217. *Telicota bambusa*, Moore.
Beeling, rare.
218. *Padmona goloides*, Moore.
219. *Padmona dara*.
220. *Padmona palmarum*.
Beeling, rare.
221. *Padmona* sp.
Beeling, two specimens.
222. *Ampittia maro*, Fabricius.
223. *Satarupa bhagava*, Moore.
224. *Thanaos indistincta*, Moore.
225. *Tagiades ravi*, Moore.
226. *Tagiades pralaya*, Moore.
227. *Abaratha vasava*, Moore.
Beeling, rare.
228. *Abaratha sura*, Moore.
229. *Gangara thyrsius*, Fabr.
230. *Hyarotis adrastus*, Cramer.
Poungadaw, rare.
231. *Coladenia dan*, Fabr.
232. *Udaspes folus*, Cramer.
233. *Plesioneura alysos*, Moore.
234. *Plesioneura asmara*, Butler.
235. *Plesioneura aurivitata*, Moore.
Beeling, rare.
236. *Astictopterus salsala*, Moore.
237. *Astictopterus subfasciata*.

238. *Astictopterus olivascens*.
Beeling, rare.
239. *Astictopterus zamites*, Butler.
240. *Astictopterus diocles*, Moore.
241. *Halpe beturia*, Hewitson.
242. *Halpe* sp.
Rangoon, rare.
243. *Halpe* sp.
Rangoon, rare.
244. *Suastes aditus*.
245. *Saragesa dasahara*, Moore.
246. *Taractocera sagara*.
247. *Hesperia* sp.
Poungadaw, rare.
248. *Baracus septentrionum*.
Beeling,, rare
249. *Isoteinon cephal*,
Beeling, rare.
250. *Isoteinon atkinsoni*, Moore.
Rangoon, common.
251. *Isoteinon* sp.
Beeling, rare.
- 252 *Isoteinon* sp.
Beeling, rare.

NOTE ON *VIGNA VEXILLATA*.

BY THE REV. A. G. CANE.

VISITORS to Matheran will have noticed here and there growing beside the pathway on the hill in October the sweet pea or *Vigna vexillata*, but no botanist seems to have noticed the ingenious contrivance by which it secures the fertilization of the flower.

When in full bloom it is of a pale violet colour with deeper shades on certain parts of the petals. The centre of the flower has a couple of yellow spots reminding one of the Heartsease.

The stamens and pistil are hidden from view; these are enclosed in the keel on the flower's right side below. This sheath-like keel is in the form of a panther's claw, pointing towards the centre of the flower. At the end of the claw is a small aperture, whilst near the base in front and under one of the alæ of the flower is a prominent hump. The carpel lies along the inside of the convex curve of the

sheath, having a distinct bend inwards about the middle of the curve; this bend acts as a powerful lever on the style. The stigma is found just inside the aperture at the end. The pistil is arranged as in the pea and is inside the sheath.

Having thus described the flower we will see how all these appliances are brought into play for the purpose of fertilization. The insect in search of honey makes for the yellow centre of the flower, alighting on the lip or *alæ* which lies on the hump. Forcing its head into the centre of the flower, all its weight is exerted in pressing down the hump, which acts on the lever in the carpel and forces the style so far through the aperture as to cause the stigma to rub against the insect's back, and so obtain the pollen which has been brought from another flower. On the insect retiring the style springs back again into its place.

But if we look again at the sheath we find that the aperture is too small to admit of the stamens protruding at the same time as the pistil, but become crowded together inside the opening of the sheath.

Here another curious contrivance is provided. Along the end of the style on the inside of the curve, after the stigma, is placed a brush with the hairs projecting outwards. As the style projects this brush carries off the pollen from the anthers and leaves it on the insect's back to fertilize the next flower it may visit. During my short stay at Matheran I did not have an opportunity of noticing an insect visit one of these flowers, but the projecting style curves so exactly over the spot where the insect would be situated to secure the honey that there seems but little doubt that this is the process that is gone through.

Any one taking one of these flowers in the hand and depressing the keel only as much as would be done by a bee at work will notice the end of the pistil suddenly appear to the extent of nearly half an inch, bringing with it the brush charged with yellow pollen, which it has carried with it on its way through the opening in the sheath.

It would be interesting if any one could prove by observation that my conjecture is a correct one.

A. G. CANE.

Since writing the above, Dr. T. Cooke has pointed out to me that Prof. Müller in his "Fertilization of Flowers," has remarked on all these peculiarities of the papilionaceæ, but Müller says: "In all these groups, the stigma and the pollen are applied to the *under* side of the bee," which leads me to think that this particular flower has not come under the Professor's notice.

MARATHI NAMES OF PLANTS.

WITH A GLOSSARY.

BY BRIGADE-SURGEON W. DYMCK.

(Continued from page 242.)

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| <i>Paspalum scrobiculatum</i> , Linn. | (wholesome). गोडा हरिक or कोद्रू Gorá harik or kodrú (poisonous), माजराहारिक or कोद्रू Majara harik or kodrú. |
| <i>Pastinaca glanca</i> | See <i>Peucedanum Dhana</i> , var. <i>Dalzellii</i> . |
| „ <i>grandis</i> | See <i>Peucedanum grande</i> . |
| „ <i>Shekakul</i> | See <i>Tordylium Shekakul</i> . |
| <i>Pavetta indica</i> , Linn..... | पापटी Pápti. |
| <i>Pavonia odorata</i> , Willd..... | काळावाळा Kálá válá, वाळा Válá. |
| <i>Pedaliium Murex</i> , Linn..... | करोंटा Karontá, गोक्षुर or-क Gokhsúr or Gokhsúrak, माळविगोखर Málvigokhrú. |
| <i>Peganum Harmala</i> , Linn..... | इर्मल Húrmal, इस्पंद Ispand. |
| <i>Penisetum aureum</i> | मूलतोम Múltom. |
| „ <i>cenchroides</i> , Rich... | धामन Dháman. |
| „ <i>typhoideum</i> , Rich. | बाजरी Bájri, सजगुरा Sajgúra. |
| „ „ var..... | डांगळी Dángli. |
| <i>Pentapetes phoenicea</i> , Linn ... | तांबडी दुपारी Támbari dúpári, दुपारी Dúpári. |
| <i>Pentaptera</i> | See <i>Terminalia</i> . |
| <i>Pentatropis microphylla</i> , W. and A. | सिंगरोटा Singrotá. |
| <i>Perilla ocimoides</i> , Linn..... | पांगळी Pángali. |
| <i>Periploca aphylla</i> , Dene. | रानशेर Ránsheer, बराई Barai. |
| <i>Peristrophe bicalyculata</i> , Nees | घाटी पित्तपापडा Gháti pittpápará. |
| <i>Petrea volubilis</i> , Jacq. | विलायती उक्षी Viláyati úkshi. |
| <i>Peucedanum graude</i> , C. B. Clarke. | बाफळी Báphali. |
| „ <i>graveolens</i> , Benth. | अतिछत्रा Atichhattra, शेपू Shépú. |
| „ <i>Dhana</i> , Dalz. | कोलंद Koland. |
| <i>Phalaris muricata</i> | धरचारो Dharcháro. |
| <i>Phaseolus aconitifolius</i> , Jacq... | मठ Math. |
| „ <i>adenanthus</i> , G. F Meyer. | हलाउद Halaud. |
| „ <i>Mungo</i> , Linn, variety | काळेमूग Kálémúg, उडीड Urid. |
| „ <i>pauciflorus</i> , Dalz ... | रानमूग Ránmúg. |
| „ <i>radiatus</i> | मूग Múg, P. Mungo ; Linn. var. <i>radiatus</i> . |
| „ <i>tribolus</i> , Ait..... | जंगलीमठ Jangli math, मुकण्या Máknyá, अर्कमठ Arkmath. |

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| Phaseolus trinervius, <i>Heyne</i> ... | मूकनी Mukui, मटकी Matki, मुंगीर Múngir. |
| Phayloopsis parviflora, <i>Willd.</i> ... | वायटी Vayati, रानमाउशी Ránmaushi, वाहिटी Wahití. |
| Phoenix dactylifera <i>Linn.</i> (fruit), | खुरमा Khúrmá, खारीक Khárik (<i>impd.</i>) |
| „ sylvestris, <i>Roxb.</i> | शिंदी Shindi, खजूर Khajúr. |
| „ „ (fruit). | खारीक Khárik. |
| Phrynium capitatum, <i>Willd.</i> ... | कुडाळी Kúdáli. |
| „ dichotomum, <i>Roxb.</i> | पाटी Páti. |
| Phyllanthus distichus, <i>Müll.</i> <i>Arg.</i> | रायआंवळा Rajávala, हरफारेवडी Harp-hárevári. |
| „ Emblica, <i>Linn.</i> | अंवळ or आंवळा Avala or Ávala, आमलक Ámalaka, आंवळकाठी Ávalkáthi, |
| „ lanceolarius, <i>Müll.</i> <i>Arg.</i> | भोमा Bhomá. |
| „ madraspatensis, <i>Linn.</i> | कनोछा Kanochhá. |
| „ Niruri, <i>Müll-Arg.</i> .. | भुई आंवळी Bhui ávali. |
| „ reticulatus, <i>Poiret.</i> | पावन or पुंवण, Pávan or Púvan. |
| „ retusus, <i>Roxb.</i> | See <i>Securinea Leucopyrus.</i> |
| „ turhinatus | कांटे पुंवण Kántépuvan, <i>Melanthesa turbinata</i> , <i>Wight.</i> |
| „ urinaria, <i>Linn.</i> ... | लाल भुई आंवळी Lál bhui ávali. |
| Physalis Alkakengi, <i>Willd.</i> ... | काकनज Káknañ. |
| „ indica, <i>Lam.</i> | चिरबुटली or चिरबोटी, Chirbútli or chirboti. |
| „ minima, <i>Linn.</i> var. <i>indica.</i> | थानमोडी Thánmori. |
| „ peruviana, <i>Linn.</i> | पोपटी Popti, टंकारी Tankári. |
| „ somnifera..... | See <i>Withania somnifera.</i> |
| Picrorhiza Kurroa, <i>Royle</i> (rhizome) | कुटकी Kútki, बालकडू Balkaru (<i>impd.</i>) |
| Pimpinella Anisum, <i>Linn.</i> | अनीसून Anisún, एरवाडोसे Erva doce (<i>Port.</i>) (<i>impd.</i>) |
| „ monoica | भालगा Bhálgá |
| Pinellia tuberifera, <i>Tenore</i> (tu- bers). | झरावंदेगिर्द् Zarávandégird (<i>false, impd.</i>) |
| Pinus Deodara, <i>Loud.</i> (wood) | देवदार Deodár, तेल्यादेवदार Teliyádeodár (<i>impd.</i>) |
| „ Gerardiana, <i>Wall.</i> (nnts). | चिलघोझा Chilghozá (<i>impd.</i>) |
| „ longifolia, <i>Roxb.</i> (turpen- tine) | गंधाबिरोझा Gandhábirozá, चिरिल Chirel (<i>impd.</i>) |
| Piper Betle, <i>Linn.</i> | पानवेल Pánvel, नागवेल Nágvel, कापूरवेल Kápúravel. |

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| Piper Chaba, <i>Bl.</i> | चवक Chavek. |
| „ Cubeba, <i>Linn. f.</i> (fruit). | कांकोळी Kánkoli, कबाबचिनी Kabábchini (<i>impd.</i>) |
| „ longum, <i>Linn.</i> | बंगाली पिपली Pipli, Bengáli, |
| „ „ (root) | पिपली मूळ Pipli mál. |
| „ nigrum, <i>Linn.</i> | काळी मिरी Káli miri. |
| „ officinarum <i>C.D'C.</i> (long-pepper) | मोठी पिपली Mothi pipli. |
| „ sylvestris | डोंगरीमिरची Dougri mirchi. |
| „ trioicum | कोकरवेल Kokarvel, <i>P. nigrum, Linn. var. trioicum.</i> |
| Pisonia morindifolia, <i>Plum.</i> .. | चिनई सालिट Chini sálít. |
| Pistacia cabulica, <i>Stocks</i> (resin) | मस्तकी Mastaki (<i>impd.</i>) |
| „ integerrima, <i>Stewart.</i> (galls). | काकडशिंगी Kákaráshingi (<i>impd.</i>) |
| „ Lentiscus, <i>Linn.</i> (resin). | रुमी मस्तकी Rúmi mastaki (<i>impd.</i>) |
| „ vera, <i>Linn.</i> and Pistacia Khinjuk, <i>Stocks</i> (galls) | गुलपिस्ता Gùlpistá, बुझगंज Buzganj (<i>impd.</i>) |
| „ „ (nuts) ... | पिस्ता Pistá (<i>impd.</i>) |
| Pistia stratiotes, <i>Linn.</i> | प्रश्नी Prashni, गोंडाल Gondála, शेडवेल Sher- vel. |
| Pisum arvense, <i>Linn.</i> | कलाई Kalai. |
| „ Sativum, <i>Linn.</i> | वाटाणा Watáná. |
| Pithecolobium bigeminum, <i>Benth</i> | कचलोरा Kachlorá. |
| Pithecolobium dulce, <i>Benth.</i> ... | विलायती चिंच Viláyati chinch. |
| Pittosporum floribundum, <i>W. & A.</i> | वेहकळी Vehkli. |
| Plantago Ispaghula (seed) | इस्पघुल Ispaghúl. <i>P. ovata, Forsk. (impd.)</i> |
| „ major, <i>Linn.</i> (seed) ... | बारतंग Bártang (<i>impd.</i>) |
| Platanthera Susannæ, <i>Lindl.</i> ... | कालाबी Kálábi. |
| Plectranthus incanus, <i>Link.</i> | लाल आघाडा Lal ághará. |
| Plectronia didyma, <i>Hook. f.</i> ... | अरसल Arsul. |
| Pluchea lanceolata, <i>Oliv.</i> | पातीरास्ना Pátirásná. |
| Plumbago capensis, <i>Spr.</i> | उदीचित्रक Udi chitrak, काळाचित्रक Kála- chitrak. |
| „ coccinea, <i>Boiss.</i> | लालचित्रक Lál chitrak. |
| „ zeylanica, <i>Linn.</i> | चित्रक Chitrak. |
| Plumeria acutifolia, <i>Poiret.</i> ... | खैरचपा or खुरचाफा, Kháirchampá or khúr- cháphá. |
| Poa cynosuroides | See Eragrostis cynosuroides, <i>Retz.</i> |
| Pogostemon Patchouli, <i>Pelle.</i> | पांच Páanch, मालीपांच Málipáanch. |
| „ purpuricaulis .. | पांगळा Pánglá, <i>P. parviflorus, Benth.</i> |

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| <i>Poinciana elata</i> , <i>Linn.</i> | संदेसरा Sandesrá. |
| „ <i>pulcherrima</i> | See <i>Cæsalpinia pulcherrima</i> . |
| „ <i>regia</i> , <i>Bojer</i> | गुलतुरा Gúltúra, गुलमोहर. Gúlmohar. कुंकुम- केशर Kúmkúmkéshar. |
| <i>Polyalthia cerasoides</i> , <i>Benth.</i> and <i>H. f.</i> | हुम Húm. |
| „ <i>longifolia</i> , <i>Benth.</i> <i>H. f.</i> | जांभुळदेवदार Jámhúl deodár. |
| <i>Polyanthes tuberosa</i> , <i>Linn.</i> ... | गुलछडी Gúlchhari, गुलशबू Gúlshabú. |
| <i>Polygala chinensis</i> , <i>Linn.</i> | नेग्ली Négli. |
| <i>Polygonum aviculare</i> , <i>Linn.</i> ... | केशरी बंदक Keshri-bandak. |
| „ <i>chinense</i> , <i>Linn.</i> ... | परळ Paral. |
| „ <i>glabrum</i> , <i>Willd.</i> ... | रक्तरोहिडा or रक्तरोडा, Raktarohidá or rák- trorá. |
| <i>Polypodium quercifolium</i> , <i>Spr.</i> | अश्वकातरी Ashvakátri, बाशिंग Báshing. |
| „ <i>vulgare</i> , <i>Linn.</i> ... | बिसफैज Bisfaj (<i>impd.</i>) |
| <i>Polyporus officinalis</i> , <i>Fries.</i> | घारीकून् Ghárikún. |
| <i>Pongamia glabra</i> , <i>Vent.</i> | करंज or करज, Karanj or karaj, सुखचैन Súkh- chain. |
| <i>Populus euphratica</i> , <i>Oliv.</i> | भान or बहान, Bhán or bahán. (The Sind boxes are made of the wood.) |
| <i>Porana racemosa</i> | भौरी Bhauri, गरीया Gariyá. <i>P. malabarica</i> , <i>Clarke.</i> |
| <i>Porphyra vulgaris</i> , <i>Ag.</i> | लस Las. |
| <i>Portulaca oleracea</i> , <i>Linn.</i> | कुर्फा: Kúrfah, मोठी घोळ Mothí ghol. |
| „ <i>quadrifida</i> , <i>Linn.</i> ... | रानघोळ Ránghol, रायघोळ Raighol, चिलघोळ Chilghol. |
| „ <i>tuberosa</i> , <i>Roxb.</i> | लूनक Lúnak. |
| <i>Potamogeton pectinatus</i> , <i>Linn.</i> | फास Phás. |
| <i>Pothos officinalis</i> | See <i>Scindapsus officinalis</i> . |
| „ <i>pertusa</i> | See <i>Scindapsus pertusus</i> . |
| <i>Prangos pabularia</i> , <i>Lindlt.</i> (fruit). | फितुरासालियून् Phitúrasáliyún (<i>impd.</i>) |
| <i>Premna latifolia</i> , <i>Roxb.</i> | घनोरी or घनेरी Ghanori or ghanéri. |
| „ <i>Nimmoniana</i> | See <i>Mappia tomentosa</i> . |
| „ <i>scandens</i> , <i>Roxb.</i> | चंबरवेल Chambavel, चंबारी Chambári. |
| „ <i>serratifolia</i> | खारा नरवेल Khará narvel, अरण Aran. <i>Prem- na integrifolia</i> , <i>Linn.</i> |
| <i>Procris ramiflora</i> , <i>Lam</i> | खरगोळ Khargol. |
| <i>Prosopis spicigera</i> , <i>Linn.</i> | शमी Shami, समडी Samri, शमडा Shamrá, सवंदल Savandal, कानडी Kandi. |
| <i>Prunus amygdalus</i> , <i>Baillon</i> ... | बडाम Badám. |

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| <i>Prunus armeniaca</i> , <i>Linn.</i> | झरदाळू Zardálú. |
| „ <i>bokhariensis</i> | आलूबोखारा Alú bokhára. <i>P. communis</i> <i>Huds.</i> var. <i>insititia</i> . |
| „ <i>Mahalib</i> , <i>Linn.</i> | गवला Gavla, महालब Mahálab. |
| „ <i>Puddum</i> , <i>Roxb.</i> | पद्मकाष्ठ Padmakáshta. |
| <i>Psidium pyrifera</i> | पेरु Perú. <i>P. Guyava</i> , <i>Raddi</i> . |
| <i>Psophocarpus tetragonolobus</i> . <i>Neek.</i> | चारपट्टी Chárpatti, चौधारी Chaudhári. |
| <i>Psoralea corylifolia</i> , <i>Linn.</i> | बावंची Bávanchi. |
| <i>Pteris aquilina</i> | नेत्सा Nétsá. |
| <i>Pterocarpus Marsupium</i> , <i>Roxb.</i> | बिबला Bibla, होनी Houi. आसन Ásan. |
| „ <i>santalinus</i> , <i>Linn.</i> f | रक्तचंदन Rakta chandan, रतांजळी Ratánjli. |
| <i>Pterospermum acerifolium</i> . <i>Willd.</i> | कणक-चंपा Kunak-chanipá, करणीकारा Karm- kára. |
| „ <i>suberifolium</i> , <i>Lam</i> | मुचकुंद Múchakúnd. |
| <i>Ptychotis ajowan</i> | See <i>Carum copticum</i> . |
| <i>Punceria coagulans</i> | See <i>Withania coagulans</i> . |
| <i>Punica Granatum</i> , <i>Linn.</i> | अनार Anár, डालिंब Dálimb. |
| „ „ (double flowers). | गुलनार Gúlnár. |
| <i>Putranjiva Roxburghii</i> , <i>Wall.</i> | जीवनपुत्र Jivanputra. |
| <i>Pyrethrum indicum</i> | See <i>Chrysanthemum indicum</i> . |
| <i>Pyrus Cydonia</i> (seed) | See <i>Cydonia vulgaris</i> . |
| <i>Pythonium Wallichianum</i> , ... <i>Schott.</i> | शेवाळें Sheválé. This term (Linga temples) is applied to Arum flowers generally. |
| <i>Quercus infectoria</i> , <i>Oliv.</i> (gall.) | माजूफळ Májúphal, माया Máya. |
| <i>Quisqualis indica</i> , <i>Linn.</i> | विलायती चमेली Viláyati chaméli. |
| <i>Randia dumetorum</i> , <i>Lam.</i> | गेळ Gél, गेळफळ Gelaphal, पेरअळ Peralu, मिंधळ Mindhal, मोनगिळी Monigeli. |
| „ <i>uliginosa</i> , <i>D. C.</i> | पेंढारी Pendhári, पेंद्रू Pendhrú, पेंढर Pendhar. |
| <i>Raphanus sativus</i> , <i>Linn.</i> | मुळा Múla. |
| „ „ var. <i>caudatus</i> .. | मोगरी Mogri. |
| <i>Rauwolfia serpentina</i> , <i>Benth.</i> ... | हर्कय or हडकी, Herkai or harki. |
| <i>Reinwardtia trigyna</i> , <i>Planch.</i> .. | अबई Abai. |
| <i>Remusatia vivipara</i> , <i>Schott.</i> | रुखाळू Rúkhálú. |
| <i>Rhamnus Wightii</i> , <i>H. & A.</i> ... | रक्तरोहिडा or रक्त्रोडा, Raktarohidá or raktrora. |
| <i>Rhazya stricta</i> , <i>Dene.</i> | सेवर Sevar. |
| <i>Rheum officinale</i> , <i>Baill.</i> | रेवन खताई Revan khatai. |
| <i>Rhinacanthus communis</i> , <i>Nees</i> | गजकर्णी Gajkarni. |
| <i>Rhizophora mucronata</i> , <i>Lam.</i> ... | कांदळ Kandal. |

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| <i>Rhus coriaria</i> , <i>Linn.</i> (fruit) ... | सिमाक Simák (<i>impd.</i>) |
| <i>Ricinus communis</i> , <i>Linn.</i> | एरंडी Erandi. |
| <i>Rivea ornata</i> , <i>Chois.</i> | फांद Phánd. |
| „ <i>hypocrateriformis</i> , <i>Chois.</i> .. | कलमीलता Kalmilatá. |
| <i>Rosa damascena</i> , <i>Mill.</i> | गुलाबाचें झाड Gúlāba-che-jhár |
| „ <i>glandulifera</i> , <i>Roxb.</i> | कांदेशेवती Kantéshevati. |
| <i>Rostellularia procumbens</i> | See <i>Justicia procumbens</i> . |
| <i>Rottlera dicocca</i> , <i>Roxb.</i> | पेटारी Petári. |
| „ <i>tinctoria</i> | See <i>Mallotus philipensis</i> . |
| <i>Rourea santaloides</i> , <i>W. & A.</i> ... | वर्धारा Vardhárá. |
| <i>Rubia cordifolia</i> , <i>Linn.</i> | मंजिष्ट Manjishta, इतारी Itári. |
| <i>Rubus lasiocarpus</i> , <i>Smith.</i> | गौरीफळ Gauriphal. |
| <i>Ruellia glutinosa</i> | See <i>Strobilanthes glutinosus</i> . |
| „ <i>imbricata</i> | See <i>Phayloopsis parviflora</i> . |
| „ <i>infundibuliformis</i> | See <i>Crossandra undulæfolia</i> . |
| <i>Rumex</i> sp. (fruit) | गुलहमझ Gulhamaz (<i>impd.</i>) |
| „ <i>vesicarius</i> , <i>Linn.</i> | चुका, चाकवत, or चाकोता, Chúká, chákwat, or chákotá. |
| <i>Rungia repens</i> , <i>Nees</i> | घाटी पित्तपापडा, Ghati pitpápará. |
| <i>Ruta graveolens</i> , <i>Linn.</i> var. <i>angustifolia</i> | सुदाब Súdáb. Corrupt form in Marathi सुताप Sútáp. |
| <i>Saccharum Munja</i> | सर Sar, सिरकी Sirki. S. Sara, <i>Roxb.</i> |
| „ <i>officinatum</i> , <i>Linn.</i> .. | ऊस Us. |
| „ <i>spontaneum</i> , <i>Linn.</i> .. | कंगरा Kangará, काश Kásh, बरू Barú. |
| <i>Saccopetalum tomentosum</i> , <i>H.</i> <i>f. & T.</i> | किर्नी Kirni, करी Kari, हूम Hum. |
| <i>Sagenia coadunata</i> | काज्याचें बाशींग Kajriyachè bashing. Beach fern. |
| <i>Sagercea laurina</i> | See <i>Bocagea Dalzellii</i> . |
| <i>Sageretia Brandrethiana</i> . <i>Aitch.</i> | गांगर Gángar. |
| <i>Sagittaria obtusifolia</i> , <i>Linn.</i> .. | नलकूट Nalkút. |
| <i>Salacia prinoides</i> , <i>D. C.</i> | निसळबोंडी Nisalbondi. |
| <i>Salix caprea</i> , <i>Linn.</i> | बेदमुष्क Bedmúshk (<i>impd.</i>) |
| „ <i>tetrasperma</i> , <i>Roxb.</i> | वालुंज Váluñj, बीतसा Bitasá. |
| <i>Salmalia malabarica</i> | See <i>Bombax malabaricum</i> . |
| <i>Salsola fruticosa</i> | See <i>Suaeda fruticosa</i> . |
| <i>Salvadora oleoides</i> , <i>Dene.</i> | खांखिण Khákhin. |
| „ <i>persica</i> , <i>Garcin.</i> ... | खांखिण Khákhin, पीलू Pilú. |
| <i>Salvia plebeia</i> , <i>R. Br.</i> | कमरकस Kamarkas |
| <i>Sansevieria Roxburghiana</i> ... | घनसफन Ghanasphan, गोकर्ण Gokarna. S- zeylanica, <i>Willd.</i> |

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| <i>Santalum album</i> , <i>Linn.</i> | चंदन Chandan. |
| <i>Sapindus trifolius</i> , <i>Linn.</i> | रिठा Rithá. |
| <i>Sapium baccatum</i> | See <i>Excoecaria baccata</i> . |
| „ <i>sebiferum</i> | See <i>Croton sebiferum</i> . |
| <i>Sapota tomentosa</i> | See <i>Sideroxylon tomentosum</i> . |
| <i>Saraca indica</i> , <i>Linn.</i> | अशोक Ashok, ओसग Aosag, असूपाला Asúpálá. |
| <i>Sarcostemma brevistigma</i> , <i>W.</i> & <i>A.</i> | सोमवेल Somvel. |
| „ <i>viminale</i> | फोक Phok. <i>S. intermedium</i> , <i>Dcne.</i> |
| <i>Sauromatum pedatum</i> , <i>Schott.</i> | लोठ Loth, भस्मकंद Bhasmikand. |
| <i>Saussurea Lappa</i> , <i>C. B. Clarke</i> | कुष्ठ Kusht, उपलेट Upalét, चोख Chokh. |
| <i>Scævola Kœnigii</i> , <i>Fahl.</i> | भद्रक Bhadrak. |
| <i>Schleichera trijuga</i> , <i>Willd.</i> ... | कोशिव Koshimb, कुसंब Kúsamb. |
| <i>Schrebera Swietenoides</i> , <i>Roxb.</i> | मोकरडी Mokerí, मोख Mokh. |
| <i>Schweinfurthia sphaerocarpa</i> , <i>A. Braun.</i> | सनिपात् Sanipát. |
| <i>Scilla hyacinthoides</i> , <i>Linn.</i> ... | भुईकंद Bhuikand. |
| „ <i>indica</i> | See <i>Urginea indica</i> . |
| <i>Scindapsus officinalis</i> , <i>Schott.</i> , | गज पिंपळी Gajpimpali. |
| „ <i>pertusus</i> , <i>Schott.</i> ... | गणेशकंद or गणेशवेल. Ganeshkand or ganeshvel. |
| <i>Scirpus Kysoor</i> , <i>Roxb.</i> | कचर Kachará, फुर्वीण Phúrvín. |
| „ <i>subulatus</i> , <i>Vahl.</i> | लवाळा Laválá. |
| <i>Scelopora crenata</i> | हिंतालू Hintálú. |
| <i>Sentia indica</i> , <i>Brogn.</i> | चिमट Chimat. |
| <i>Securinega Leucopyrus</i> , <i>Müll-</i> <i>Arg.</i> | वेडेपुवण Vorepuvan. |
| „ <i>obovata</i> , <i>Müll-Arg.</i> | कोडरसी Kodarsi. |
| <i>Semicarpus Anacardium</i> , <i>Linn.</i> | बिळा Bibbá. |
| <i>Sesamum indicum</i> , <i>Linn.</i> | तीळ Til, मोठेतीळ Mothetil, मरहेतीळ Mardhétíl. |
| <i>Sesbania aculeata</i> , <i>Pers.</i> , and <i>procumbens</i> , <i>W.</i> & <i>A.</i> | रानशेवरी Ránshevari. |
| „ <i>ægyptiaca</i> , <i>Pers.</i> ... | शेवरी Shevari, जयंती Jayanti. |
| „ <i>grandiflora</i> , <i>Pers.</i> ... | अगस्ती or अगस्तया, Agásti or agastiya, हदगा Hadgá. |
| <i>Sesili indicum</i> , <i>W.</i> & <i>A.</i> | किरमिजी अजवान Kirminji, Ajván. |
| <i>Sesuvium portulacastrum</i> , <i>Linn.</i> | धापा Dhápá. |
| <i>Setaria glauca</i> , <i>Beauv.</i> | कोलखिंदर Kolkhindar, कोलार Kolár, भादळी Bháðali. |
| „ <i>italica</i> , <i>Kunth.</i> | काळी कांगणी Káli-kángani. कडवी कांगणी Karvi-kángani. |

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| <i>Setaria verticillata</i> , Beauv. | कुत्र्याचीचार Kutriyachichar, पंधाड Pandhár. |
| <i>Shorea robusta</i> , Gärtn. | शाल Shál. |
| „ „ (resin.) | राल Rál, डामर Damar (<i>impd.</i>) |
| <i>Sida acuta</i> | तुकटी Túkati, तुपकरिया Túpkaríyá. <i>S. carpinifolia</i> , Linn. |
| „ <i>cordifolia</i> , Linn..... | चिकणा Chikná, लोबीरसीर भाजी Lobirsir-bhájí. |
| „ <i>rhomboidea</i> , Roxb..... | सहदेवी Sahadevi, अतिबला Atibalá. <i>S. rhombifolia</i> , var. <i>rhomboidea</i> , Linn. |
| <i>Sideroxylon tomentosum</i> , Roxb. | कांटेकुंबळ Kánte-kúmbal. |
| <i>Sinapis campestris</i> | See <i>Brassica campestris</i> . |
| „ <i>juncea</i> | See <i>Brassica juncea</i> . |
| „ <i>nigra</i> | See <i>Brassica nigra</i> . |
| <i>Sisymbrium Irio</i> , Linn. (seeds). | खाक्षी Khákshi (<i>impd.</i>), रानतिकी Rántiki. |
| <i>Smilacina fusca</i> | झीप्रीगाठी किराईत Jhiprigáthi, Kiráit. |
| <i>Smilax China</i> , Linn. | चोबचिनी Chobchini (<i>impd.</i>) |
| „ <i>officinalis</i> , Humb. et Bonpl. | विलायती सालिस Viláyeti-sális. |
| „ <i>ovalifolia</i> , Roxb. | घोटवेल Ghotvel, गूटी Gúti, हिण्यशाक Hinya-sháka. |
| <i>Smithia sensitiva</i> , Ait. | कवला Kavalá. |
| „ <i>blanda</i> | मोठीबरकी Mothi-barki. |
| <i>Solanum Dulcamara</i> , Linn..... | अनबेसालब Anabesálab. |
| „ <i>giganteum</i> , Jacq..... | कुत्री Kútri, चीना Chiná. |
| „ <i>indicum</i> Linn. | रिंगणी Ringani, डोली Dorli, चिचुर्दी Chin-chúrti. |
| „ <i>Jacquini</i> | भुईरिंगणी Bhuiringani, कांटेरिंगणी Kánte-ringani. <i>S. xanthocarpum</i> , Schrad. |
| „ <i>lycopersicum</i> | वालवांगी Válvángi, वेलवांगी Welvángi, <i>Lycopersicum esculentum</i> , Miller. |
| „ <i>Melongena</i> , Linn | बैंगण Baingan, वांगें Vángé. |
| „ <i>nigrum</i> , Linn. | कामुणी Kamuni, काकमाची Kakamachi. |
| „ <i>trilobatum</i> , Linn..... | मोठीरिंगणी Mothi-ringani. |
| „ <i>tuberosum</i> , Linn | बटाटा Batátá. |
| <i>Sonneratia acida</i> , Linn. f. | तिवर Tivar. |
| <i>Sopubia delphinifolia</i> , G. Don. | दुधाळी Dúdháli. |
| <i>Sorghum saccharatum</i> , Pers.... | इम्फी Imphi. |
| „ <i>vulgare</i> , Pers..... | जोंधळा Jondhalá, जवारी Javári. |
| „ „ var. | सुंडिया Súndiyá, शाळू Shálú. |
| <i>Soymida febrifuga</i> , Adr. Juss... | रोहण Rohan, पोलारा Polará. |
| <i>Spatholobus Roxburghii</i> , Benth | फलसन Phalsan. |
| <i>Spermaceoce hispida</i> , Linn..... | मदनघंटी Madanaghanti, घंटीची भाजी Ghant che bhájí, धोती Dhoti. |

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| <i>Sphæranthus indicus</i> | मुंडी Múndi, गोरख मुंडी Gorakh múndi, खडक शोपू Kharak-shépú, नाई Nai. |
| <i>Spilanthus Acmella</i> , <i>Linn.</i> var. <i>oleracea</i> , <i>Clarke</i> . | अचरबोंडी Acharabondi. |
| <i>Spinacia oleracea</i> , <i>Mill.</i> | पालक Pálak. |
| <i>Spondias mangifera</i> , <i>Pers.</i> | अंबाडा Ambará, रानअंबा Ránambá, खटांबा Khatambá, दोळआंबा Dolámbá, अमडा Amrá. |
| <i>Sponia Wightii</i> | कापशी Kapashi, खडगोळ Khargol. <i>S. orientalis</i> , <i>Planch.</i> |
| <i>Stemodia ruderalis</i> | See <i>Lindenbergia urticæfolia</i> . |
| <i>Stephanotis floribunda</i> , <i>Poir.</i> ... | मुगडीवेल Múgari vel. |
| <i>Stephegyne parviflora</i> , <i>Korth.</i> | कदंब Kadamb, हलवण Halavan, vulg. कलंब Kalamb. |
| <i>Sterculia colorata</i> , <i>Roxb.</i> | खौशी Khaushi, भाईकोई Bhaikoi. |
| „ <i>foetida</i> , <i>Linn.</i> | देवदार Deodár. |
| „ <i>guttata</i> , <i>Roxb.</i> | गोलदार Goldár, कुकर Kúkar. |
| „ <i>urens</i> , <i>Roxb.</i> | पांदूक Pándrúk, कावळी Kávali, कांडूळ Kándul, करै Karai, सालधवल Sál dhaval. |
| „ „ (gum) | करैगोंद Karaigond. |
| „ <i>villosa</i> , <i>Roxb.</i> | गुलखंदर Gúlkhandar, उदळ Udál. |
| <i>Stereospermum chelonoides</i> , <i>D.C.</i> | पाडळ Paral. |
| „ <i>suaveolens</i> , <i>D. C.</i> | कालगोरी Kálgori, पाद्री Pádri, पाटला Pátalá. |
| <i>Streblus asper</i> , <i>Lour.</i> | खरोटा Kharotá, करेरा Karerá. |
| <i>Strobilanthus ciliatus</i> , <i>Nees</i> .. | कावी Kárví, करा Kará, कारव Kárav, कावी Kárví. |
| „ <i>glutinosus</i> , <i>Nees</i> . | वायटी Vayati. |
| „ <i>Heyneanus</i> , <i>Nees</i> . | आकरा or अकरा Ákrá or akrá. |
| „ <i>ixiocephalus</i> , <i>Benth.</i> | कावी Karvi, &c. |
| <i>Stræmeria tetrandra</i> | See <i>Cadaba indica</i> . |
| <i>Strychnos colubrina</i> , <i>Linn.</i> | काजरवेल Kájarvel, नागमुष्टी Nágamúshiti, कनळ Kánal. |
| „ „ (wood)... | गोहागरी लाकडी Gohágari lákari. |
| „ <i>Ignatii</i> , <i>Berg</i> | पपीता Papitá. |
| „ <i>Nux-vomica</i> , <i>Linn.</i> ... | काजरा Kájra, कुचला Kúchla. |
| „ <i>Potatorum</i> , <i>Linn. F.</i> | निवळी Nivali, कतक Katak, चिलबिज Chilbiji, निर्मळी Nirmali. |
| <i>Stylodiscus trifolius</i> | See <i>Bischoffia javanica</i> . |
| <i>Styrax Benzoiu</i> , <i>dry and</i> (resin) | ऊद Ud, लोबान Lobán (<i>impd.</i>) |
| <i>Succeda fruticosa</i> , <i>Forsk</i> | लाना Láná, मोरस Moras. |
| „ <i>nudiflora</i> , <i>Mog.</i> | मोरस Moras. |

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| <i>Swertia affinis</i> , <i>Clarke</i> | सिलारस Siláras. |
| „ <i>angustifolia</i> , <i>Ham</i> | पहाडी किराईत Pahari kiráit. |
| „ <i>Chirata</i> , <i>Ham</i> | किराईत Kiráit. |
| „ <i>corymbosa</i> , <i>Wight</i> | कडवी नाई Karvi nai. |
| „ <i>decussata</i> , <i>Nimmo</i> | कडवी शिलाजीत Karvi shilájit. |
| „ <i>paniculata</i> , <i>Wall</i> | कडवी नाई Karvi nai. |
| <i>Symplocos racemosa</i> , <i>Roxb</i> | लोध्र Lodhira, हुरा Húra. |
| <i>Synantherias sylvatica</i> , <i>Schott</i> . | वज्रमूठ Vajr-múth, उझोमूठ Uzo-múth of Goa. |
| <i>Syzygium Jambolanum</i> | See <i>Eugenia Jambolana</i> . |
| „ <i>salicifolium</i> | See <i>Eugenia lissophylla</i> . |
| <i>Tabernaemontana coronaria</i> , <i>Br</i> . | तगर Tagar, नांदेट Nándét. (गणतगर Gantagar var. with large clusters of flowers.) |
| „ <i>dichotoma</i> , <i>Roxb</i> . | टिटल Tital. |
| <i>Tacca pinnatifida</i> , <i>Forsk</i> | सरडेचामाड Sarḍechámár, देवकांदा Deokándá. |
| <i>Tagetes patula</i> | गुलझाकी Gúljáferi, मखमल Makhmal. |
| <i>Tamarindus indica</i> , <i>Linn</i> | रोझ्याचें फूल Rozia chephul. <i>T. erecta</i> , <i>Linn</i> . |
| „ „ (ripe pods). | अम्ली Amli, चिंच Chinch. |
| <i>Tamarix dioica</i> , <i>Roxb</i> | अंबुरची चिंच Ambúr-chi-chinch. |
| „ <i>ericoides</i> , <i>Rothb</i> | लाल झाऊ Lál jhan. |
| „ <i>gallica</i> , <i>Linn</i> | झाऊ Jhan, सरू Sarú. |
| „ „ (galls) | झाऊ Jhan. |
| „ <i>orientalis</i> (galls) | मगियामाई Magiyá mai. |
| <i>Tapinocarpus indicus</i> , <i>Dalz</i> | मगियामाई Magiyá mai. <i>T. articulata</i> , <i>Vahl</i> . |
| <i>Taraxacum Dens-leonis</i> | डुकरमुंगळी Dúkarmúngli. |
| <i>Taxus baccata</i> , <i>Linn</i> . (leaves)... | भुईपत्र Bhui patra. <i>T. officinale</i> , <i>Wiggers</i> . |
| <i>Tecoma undulata</i> , <i>G. Don</i> | बर्मी Barmi (<i>impd</i>) |
| <i>Tectona grandis</i> , <i>Linn</i> . .. | रक्तरोहिडा or रक्तरोंडा, Rakta rohida or raktrora. |
| <i>Tephrosia purpurea</i> , <i>Pers</i> | साग Ság. |
| „ <i>suberosa</i> | सरपुखा Sarpúnkhá, उन्हाळी Unháli. |
| <i>Terminalia Arjuna</i> , <i>Bedd</i> | See <i>Mundulea suberosa</i> . |
| „ <i>belerica</i> , <i>Roxb</i> | अर्जुन Arján, शार्दूल Shárdúl, पिंजळ Pinjal. |
| „ <i>Catappa</i> , <i>Linn</i> ... | बेहेडा Beherá, हेला Helá, हेलारी Helári, हिरडा Hiradá, एळा Ela. |
| „ <i>Chehula</i> <i>Retz</i> | बदाम Badám, बंगाली बदाम Bangáli badám. |
| „ <i>paniculata</i> , <i>W. & A</i> . | चाम्हारी हिरडा Chamhári hiradá, रंगारीहिरडा Rangárihiradá. |
| „ <i>tomentosa</i> , <i>W. & A</i> . | किंजळ Kinjal, किजुरा Kijúrá. |
| <i>Tetrameles nudiflora</i> , <i>R. Br</i> ... | ऐन Ain, असण Asan, आईन Áin. |
| <i>Tetranthera apetala</i> | जंगली भेंडी Jangli bhendi. |
| „ <i>lancifolia</i> | See <i>Litsaea tomentosa</i> . |
| „ <i>monopetala</i> | „ lancifoliá. |
| | „ polyantha. |

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| <i>Tetanthera Roxburghii</i> | <i>See</i> <i>Litsaea sebifera</i> . |
| <i>Thalictrum foliolosum</i> , <i>D. C.</i> ... | पियारंगा <i>Piyaranga (impd)</i> . |
| <i>Thespesia Lampas</i> , <i>Dalz</i> | रानभेंडीचें झाड <i>Rán bhendi che jhar</i> . |
| „ <i>populnea</i> , <i>Corr</i> | भेंडीचें झाड <i>Bhendi che jhar</i> , पिंपरणी <i>Pimparni</i> , पिंपरी <i>Pimpri</i> . |
| <i>Thevetia nereifolia</i> , <i>Juss</i> | पिवळा कण्हेर <i>Pivalá-kanher</i> . |
| <i>Thunbergia fragrans</i> , <i>Roxb</i> ... | एरीवेल <i>Erivel</i> for वेडीवेल. |
| <i>Tiaridium indicum</i> , <i>Eriyel</i> | भूरुंडी <i>Bhúrúndi</i> . <i>Heliotropium indicum</i> , <i>Linn</i> . |
| <i>Tinospora cordifolia</i> , <i>Miers</i> ... | गुळवेल <i>Gúlvel</i> , अंबरवेल <i>Ambarvel</i> , अमरवेल <i>Amarvel</i> , अमृता <i>Amritá</i> , गरुडवेल <i>Garúdvél</i> , घरोळ <i>Gharol</i> . |
| <i>Toddalia aculeata</i> , <i>Pers</i> | मोडा आगेरु <i>Morá-ágerú</i> . |
| <i>Tordylium Secacul</i> , <i>Mill</i> | शकाकुले मिस्री <i>Shekákúlé misri</i> . |
| <i>Tradescantia axillaris</i> , <i>Linn</i> ... | इचका <i>Ichka</i> , काजळ <i>Kájal</i> . |
| „ <i>discolor</i> , <i>Willd</i> ... | लाल कुवार <i>Lál.kúvar</i> . |
| <i>Traga involucrata</i> , <i>Mull-Arg</i> ... | कुलती <i>Kulti</i> , कोलेती <i>Koléti</i> , थोरआग्या <i>Thora</i> <i>ágiyá</i> , कळावी <i>Kalávi</i> . |
| <i>Trapfa bispinosa</i> , <i>Roxb</i> | शिंघाडा <i>Shinghárá</i> . |
| <i>Trewia nudiflora</i> , <i>Willd</i> | पेटारी <i>Petári</i> . |
| <i>Triauthema intermedia</i> | वाहो <i>Vaho</i> . <i>T. hydaspica</i> , <i>Edge</i> . |
| „ <i>micrautha</i> | फसरलानी <i>Fasarláni</i> . <i>T. pentandra</i> , <i>Linn</i> . |
| „ <i>obcordata</i> | खाप्रा <i>Kháprá</i> , नरमा <i>Narimá</i> . <i>T. monogyna</i> , <i>Linn</i> . |
| <i>Tribulus terrestris</i> , <i>Linn</i> | गोखरु <i>Gokharú</i> , सराटे or सरांटे <i>Saráté or</i> <i>Saránté</i> . |
| <i>Trichodesma africanum</i> , <i>Br</i> ... | पाबरपानी <i>Pábarpáni</i> . |
| „ <i>indicum</i> , <i>Br</i> | जिंधी <i>Ginghi</i> , गावजबान <i>Gaozabán</i> . |
| <i>Tricholepis glaberrima</i> | मोठाबोर <i>Motábor</i> . |
| „ <i>procumbens</i> | <i>See</i> <i>Volutarella divaricata</i> . |
| <i>Trichosanthes anguina</i> , <i>Linn</i> .. | परुळ <i>Parúl</i> , पडवळ <i>Parval</i> , पांढोळ <i>Pándol</i> . |
| „ <i>cordata</i> , <i>Roxb</i> | रानपडवळ <i>Rán parval</i> . |
| „ <i>cucumerina</i> , <i>Linn</i> ... | कडूपडवळ <i>Karúparval</i> (of the Concan). |
| „ <i>dioica</i> , <i>Roxb</i> | कडूपडवळ <i>Karúparval</i> (of Guzerat). |
| „ <i>palmata</i> , <i>Roxb</i> | कांडल or कवंडळ <i>Kaundal or Kavandál</i> . |
| <i>Trigonella corniculata</i> , <i>Linn</i> ... | तीरप <i>Tirap</i> . |
| „ <i>Fenum-graecum</i> , <i>Linn</i> ... | मेथी <i>Methi</i> . |
| <i>Triticum aestivum</i> , <i>Lam</i> | गहू <i>Gahún</i> . |
| <i>Triumfetta pilosa</i> , <i>Roth</i> | कुतरे वांदरे <i>Kútre Vándré</i> . |
| „ <i>rhomboidea</i> , <i>Jacq</i> ... | निचरडी <i>Nichardi</i> . |
| <i>Turnera ulmifolia</i> , <i>Don</i> | भिजरा <i>Bhinjá</i> . |
| <i>Turreea virens</i> , <i>Linn</i> | कापूर भेंडी <i>Kápúr-bhendi</i> . |

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| <i>Tylophora asthmatica</i> , <i>W. & A.</i> | पित्तकारी Pítkári, पित्तमारी Pitmári, पित्तवेल Pítvel. |
| „ <i>carnosa</i> , <i>Wall</i> | डिकवेल Díkvél. |
| „ <i>fasciculata</i> , <i>Ham</i> ... | भुईसेडी Bhui dori. |
| „ <i>mollissima</i> , <i>Wight</i> .. | मोशकी Moshákí. |
| <i>Typha angustifolia</i> , <i>Linn</i> | रामबाण Rámbán, रानबाजरी Ránbájeri. |
| <i>Ulmus integrifolia</i> , <i>Roxb</i> | वावळा Vávalá, पापडा Pápará, ऐनसादडा Ainsá-dara. |
| <i>Uncaria Gambier</i> , <i>Hunter</i> (ex- tract). | चिनी कात Chini kát (<i>impd.</i>) |
| <i>Uraria lagopoides</i> , <i>D. C.</i> | डवला Davalá, पिठवण Pithvan. |
| <i>Urena lobata</i> , <i>Linn</i> | वनभेंडी Vanbhendi. |
| „ <i>sinuata</i> , <i>Linn</i> | रानकापशी Rán kápsi. |
| <i>Urginea indica</i> , <i>Kunth</i> | रानकांदा Rán kándá, कोचिदा Kochinda, कोलकांदा Kolkándá. |
| <i>Urostigma</i> | See <i>Ficus</i> . |
| <i>Urtica interrupta</i> , <i>Linn</i> | खाजकुली Khájkúl, वेडेकोलती rérékolti, आग्या Ágiyá. |
| <i>Utricularia albo-coerulea</i> | काजदचीघास Kájat-chi-gháns. |
| <i>Uvaria odoratissima</i> | काळाचंपा Kálá chámpá, विलायतीचंपा Viláyeti chámpá. |
| <i>Vachellia Farnesiana</i> | See <i>Acacia Farnesiana</i> . |
| <i>Valeriana Hardwickii</i> , <i>Wall</i> (root) | तगरगंडोडा Tagarganthoda (<i>impd.</i>) |
| <i>Valeriana Hookeriana</i> , <i>W. & A.</i> | काळागवर Kálágavar. |
| <i>Vandellia pedunculata</i> , <i>Benth</i> . | गडगवेल Gadagvel. |
| <i>Vangueria edulis</i> , <i>Vahl</i> | आळू Álú. |
| „ <i>spinosa</i> , <i>Roxb</i> | चिरचोळी Chircholi. |
| <i>Vateria indica</i> , <i>Linn</i> (resin)... | सफेद डामर Safed dāmar, चंडूस Chandús (<i>impd.</i>) |
| <i>Ventilago Madraspatana</i> , <i>Gärtn.</i> | खांडवेल Khándvel लोखंडी Lokhandi. |
| <i>Verbesina biflora</i> | See <i>Wedelia biflora</i> . |
| <i>Vernonia anthelmintica</i> , <i>Willd.</i> | काळें जिरें Kálé jiré, कडु जिरें Karú jiré. |
| „ <i>conyzoides</i> , <i>Wight</i> ... | कारळें Káralyé. सहादेवी Sahádevi. |
| „ <i>divergens</i> , <i>Benth</i> | बूंदर Búndar. |
| <i>Viburnum foetidum</i> , <i>Wall</i> | नरवेल Narvel. |
| <i>Vicia Faba</i> , <i>Linn</i> (seed) | बाकला Bákala (<i>impd.</i>) |
| „ <i>hirsuta</i> , <i>Koch</i> | अंकरी Ankri. |
| <i>Vigna Catiang</i> , <i>Endl</i> | चौळाई Choulai. |
| „ <i>vexillata</i> , <i>Benth</i> | बिरमबोल Birambol, हलुला Halúlá. |
| <i>Vinca rosea</i> , <i>Roxb</i> | सदाफूल Sadaphúl. |
| <i>Viola odorata</i> , <i>Linn</i> . (flowers). | गुलेबनफशा Gúlébanafshá (<i>impd.</i>) |
| „ <i>suffruticosa</i> | See <i>Ionidium suffruticosum</i> . |

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| <i>Viscum album</i> , <i>Linn.</i> (fruit)... | किशमिशे कावलीयान Kishmishé, Kávaliyán (<i>impd.</i>) |
| <i>Vitex Negundo</i> , <i>Linn.</i> , and tri- folia, <i>Linn.</i> | निर्गूडी Nirgúndi, निर्गुडी Nirgúri, इंद्राणी Indráni. लिंगुर Lingúr. |
| „ sp. (fruit) | संभालू Sambhálú, रेणुका Rénúká (<i>impd.</i>) |
| <i>Vitis araneosus</i> , <i>Dalz.</i> | बेंदरवेल Bendarvel, घोडवेल Ghorvel. |
| „ „ (root) | चमारमुसली Chamarmúsli. |
| „ auriculata, <i>Roxb.</i> | काळीवेल Kálivel. |
| „ carnosá, <i>Wall.</i> | ओडी Odi. |
| „ discolor, <i>Dalz.</i> | तांबडे पानांची चांदवेल Tambare pánáchi chand- vel, तेलीचावेल Telichavel. |
| „ indica, <i>Linn.</i> | पालकांदा Pálkándá. |
| „ lanceolaria, <i>Roxb.</i> | खाजगोलीचावेल Khájgolicavel. |
| „ latifolia, <i>Roxb.</i> | नादेणा Nádená. |
| „ quadrangularis, <i>Wall.</i> ... | हरसंकर Harsankar, म्हैसवेल Mhaisvel, खरबुटी Kharbúti, चौधारी कांडवेल Chaudári- kandvel. |
| „ repanda, <i>W. & A.</i> | गेंडळ Gendal. |
| „ Rheedii, <i>W. & A.</i> | वांसा Vánsá. |
| „ tomentosa | शेंडवेल Shendvel. |
| „ vinifera, <i>Linn.</i> | द्राक्ष Dráksha. |
| <i>Voandseia subterranea</i> (seed)... | मोसंबी चणा Mosambi-CHANÁ. |
| <i>Volutarella divaricata</i> , <i>Benth.</i> ... | बादावर्द Bádáward. |
| <i>Webera cornbosa</i> , <i>Willd.</i> | कारे Káre. |
| <i>Wedelia biflora</i> , <i>D. C.</i> | सूनकी Sunki. |
| „ calandulacea, <i>Less.</i> ... | पिवळावाका Pivalámáká. |
| <i>Withania coagulans</i> , <i>Dunal.</i> ... | काकनज KáknaJ, पनीरबंद Panirband. |
| „ somnifera, <i>Dunal.</i> ... | अश्वगंधा Ashvagandá, तिला Tilá, कंचुकी Kanchúki. |
| <i>Woodfordia floribunda</i> , <i>Salisb.</i> | धाउरी Dhauri, धायटी Dhayati, धाऊसी Dhasisi फुलसटी Phúlsati, धायफळ Dhaiphal. |
| <i>Wrightia tinctoria</i> , <i>Br.</i> | काळाकुडा Kálákúrá. |
| „ „ (seed) | गोड इंद्रजव Gora indrajav. |
| „ tomentosa, <i>Roem et</i> <i>Schult.</i> | तांबडाकुडा Támbará-kúra. |
| <i>Xanthium strumarium</i> , <i>Linn.</i> ... | शंकेश्वर Shankesvar. |
| <i>Xanthochymus ovalifolius</i> | See <i>Garcinia ovalifolia</i> . |
| „ pictorius | See <i>Garcinia Xanthochymus</i> . |
| <i>Xylia dolabriformis</i> , <i>Benth.</i> ... | येरुळ Yerúl, जांब Jamb. |
| <i>Zanonia indica</i> , <i>Linn.</i> | चिरपुटी Chirpúti. |
| <i>Zanthoxylum alatum</i> , <i>Roxb.</i> ... | तेजफळ Tejphal, तेजबळ Tejbúl. |

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| <i>Zanthoxylum Rhetsa</i> , <i>D. C.</i> ... | तिसळ Tisal, त्रिफळ Triphal, चिरफळ Chir-phal. |
| <i>Zataria multiflora</i> , <i>Boiss.</i> | सातर् Satar (<i>impd.</i>) |
| <i>Zea Mays</i> , <i>Linn.</i> | मकाई Makai, बुटा Bútá. |
| <i>Zehneria umbellata</i> , <i>Thwaites.</i> | गोमेत्ता or गोमेदा, Gomettá or gométá. |
| „ <i>Baneriana.</i> | वराळी Varáli. |
| <i>Zinziber Cassumuner</i> , <i>Roxb.</i> ... | नीसन Nisan, मलबारी हळद Malabári-halad. |
| „ <i>officinale</i> , <i>Roscoe</i> | आलें Alé, अद्रक Adrak. |
| „ „ (dry)..... | सुंठ Súnth. |
| „ <i>macrostachyum</i> , <i>Dalz.</i> | नीसन Nisan. |
| <i>Zizyphus Jujuba</i> , <i>Lam.</i> | बोर Bor, भेर Bher, रायबोर Raibor. |
| „ <i>rugosus</i> , <i>Lam</i> | तोरण Toran. |
| „ <i>vulgaris</i> , <i>Lam.</i> | उन्नाब Unnáb (<i>impd.</i>) |
| „ <i>xylopyrus</i> , <i>Willd.</i> ... | गूती Gúti, घोंद Ghont, भुरगूती Bhúrgúti. |
| <i>Zygophyllum simplex</i> , <i>Linn</i> ... | पतलानी Patláni. |
| <i>Zornia diphylla</i> | नाळबरगी or बरकी Nalabargi or barki. |

“NESTING OF THE INDIAN HIRUNDINES.”

BY LIEUT. H. E. BARNES.

THE Hirundines are popularly known as Swallows and Martins (*Hirundinince*). To these I add the Swifts (*Cypsellince*), as they have many features in common, and together comprise one family (*Hirundinidce*). They are well represented in India, there being no less than forty-five species supposed to occur within our limits, but of this number five are somewhat doubtful. When we consider that there are but four species frequenting the British Isles [excluding the Spine-tailed Swallow (*Acanthylis caudacuta*), the Purple Martin (*Hirundo purpurea*), and the Alpine Swift (*Cypsellus melba*), all of which are extremely rare visitors], we at once see how well favoured in this respect India is compared with Great Britain. Some of these are cold weather visitors only and do not remain to breed, and the nidification of many is but imperfectly known. The habitat of several is very restricted, while others again, although generally distributed throughout the country, are yet extremely local. For instance, the Palm Swift (*Cypsellus batassiensis*) is found wherever the tar or toddy palm (*Borassus flabelliformis*) abounds, but nowhere else. In the Hirundines the bill is very small, but the gape is unusually large, reaching to a point below the eye. They all feed exclusively on insects, usually small ones, such as mosquitoes, midges and gnats. These they invariably capture on the wing.

When they have young in the nest, they collect these insects into a mass or ball which is retained in the mouth. The number thus collected is almost incredible. Their long narrow wings are admirably suited to an aerial life, and they are capable of sustaining themselves on the wing throughout the whole day, without showing the least sign of fatigue. At times they fly so high as to be barely visible, while at others they only just skim the surface of a tank. The toes of the swifts are all directed forward, enabling them to cling to the slightest projection with perfect ease, but the swallows do not possess this faculty. Some of them are exceedingly beautiful, but others are much less ornate, their colours ranging from the bright steel-blue of the Wire-tailed Swallow (*Hirundo flifera*), (which is, to my thinking, the handsomest of the family), through the sober brown of the little Sand Martin (*Cotyle sinensis*), to the sombre-hue of the better known Swift (*Cypsellus affinis*). Their nests exhibit great diversity, both as regards the style of architecture and the materials used in their construction, but each individual of a species builds a similar nest and makes use of the same kind of material, so that an oologist of moderate experience on finding a nest can tell at a glance to what species the little architect belongs. The sites chosen for the nests differ still more than the nests themselves. Some species attach them to the faces of perpendicular cliffs; others to the eaves of houses. Some place them under bridges or culverts. One chooses the leaf of a toddy palm; another a decayed bough of an acacia tree; while another bores a hole in the sandy bank of a river. Many breed in colonies, but the greater number singly. Some court the presence of man, others quite the reverse. They are mostly birds of small size. One of the largest we have in India is the Alpine Swift, which measures about nine inches in length. The Common Chimney (*Hirundo rustica*) and Wire-tailed Swallows, the Dusky Crag (*Ptyonoprogne concolor*), and several other Martins make half saucer or cup-shape nests. The first-named does not breed in the plains of India, but on the approach of the hot weather retires further north for that purpose. I found them breeding freely in the Bolan Pass and also in Southern Afghanistan, but the Wire-tailed Swallow and the Dusky Crag Martin breed generally all over the country, rearing at least two broods in the year, one in the spring and the other in the autumn. If the first clutch of eggs be taken they will lay a second, and if that be taken, a third in the same nest. The nest of the Common Swallow is gene-

rally affixed to the rafters of an outhouse or other building. They do not seem to mind the presence of man in the least. The nest of the Wire-tailed Swallow is generally placed under the cornice of a bridge, or under the bridge itself, sometimes under an overhanging shelf of rock, but always in close vicinity to water. That of the Crag Martin is placed under a projection in the face of a rocky cliff, far from the haunts of man, or under the eaves of a house in his very midst. The nests of all three are well lined with soft feathers, and they often serve for a second brood, the feathers only being renewed. The eggs, three in number, are very handsome, being white with a delicate pink tint when fresh and unblown, thickly spotted and speckled with bright red-brown and inky-purple, but the markings on the eggs of the latter are not so bright or so well defined as on those of the two former. The nest of the Mosque Swallow (*Hirundo erythropygia*) is built after a very different pattern, but the material used is the same, viz., mud, which the bird procures from the banks of the nearest pond or river. Both sexes assist in making the nest, which is of a peculiar shape, and has been, not inaptly, described as retort-shape, or rather half-retort. It is usually affixed to the roof of a cave, bridge, or culvert, or to the under-surface of the ledge of a rock. They construct a large bulb-like chamber, five or six inches in diameter, with a tubular passage of varying length reaching occasionally to quite nine inches, but in general the length is not more than four or five. The male bird often goes on lengthening this passage after the eggs are laid and while the female is sitting on them. The nest is well lined with soft feathers, and the eggs, three in number, are pure unspotted white. After the birds have once chosen a site for a nest, they are very hard to drive away. I have often broken open nests to see if any eggs had been laid, and they have always been repaired, and I have eventually obtained eggs from them. To such an extent is the constructive faculty developed in these birds that they often build two or more nests before they are satisfied, and they are known to make a winter residence for themselves in which eggs are never found. They are solitary breeders. Not so, however, the Cliff Swallows (*Hirundo fluvicola*), whose immense clusters of nests often amount to from one hundred and fifty to two hundred in number. They also build retort-shape nests, but in quite a different fashion, the bulbs or chamber portions being affixed to the under-surface of a shelving rock, or under a bridge with the tubes hanging down or rather a

little outwards, the whole looking not unlike a huge honeycomb. They are well lined with feathers, and the eggs, three in number, vary a great deal in shape, size, and colour. About half of them are pure unspotted white, and the remaining half are more or less spotted, speckled, or streaked with yellowish-brown. These markings are, however, not very clearly defined. All the eggs of a clutch are of the same type. They breed at least twice a year, nests being found from July to April in most places where they breed. These colonies are always near water. Their nests are occasionally appropriated by the Common Swift. A cluster of these nests that I found under a bridge on the Saugor road, about twenty miles from Kareli, was jointly tenanted by Cliff Swallows, Indian Swifts, and Common Sparrows (*Passer indicus*). The outer nests were occupied by the Swifts and Sparrows and the inner ones by the Cliff Swallows. The next birds are the Sand Martins (*Cotyle riparia*, *C. subsoccata*, *C. sinensis*), of which it is still an open question whether one, two, or three species occur in India. I myself have only met with one, and this is the Indian Sand Martin, whose method of breeding is somewhat similar to that of our British species, but the nesting holes seem much more scattered. They bore holes in the sandy banks of rivers to the depth of one and a half to more than four feet according to the relative hardness of the soil and at the end of this hole or passage, which is somewhat enlarged, they make a nest, composed of fine grass roots and feathers. The eggs are pure, spotless white, and almost devoid of gloss. I have never found more than three eggs in any one nest, but others speak of finding as many as five. This completes the Swallows and Martins. The Swifts differ widely in many respects from the foregoing, as do also their nests. Mud that entered so largely into their construction is now no longer found, but in its stead agglutinated saliva is most frequently used. The different species of swifts build very dissimilar nests. The nesting of the Indian Swift is so well known that it is almost superfluous to say anything about it, but frequently common every-day objects are passed over unnoticed, and to meet such cases as these I will briefly describe their nests. As a rule, they breed together in great numbers. They often make a huge cluster of nests, which they affix to the roof of a cave or other suitable place, with isolated nests or small clumps of two or three, scattered here and there in close proximity to the central mass. The bird frequents the busiest thoroughfares, as well as the most

retired spots. Another favourite site for their nests is the space between the rafters of a stable roof or verandah as well as under the eaves of houses. Great numbers of them may now be seen breeding in the verandah, under the Commissary-General's offices in the Fort. Their nests, which take a considerable time to construct, are composed of agglutinated saliva mixed with a few feathers and straws. They are of no particular shape, being at times long and narrow, occasionally almost round, but most often they are of a very irregular oblong shape. The eggs, three in number, are long narrow ovals, of a pure glossless white. The birds seem to be always breeding, for I see from my notes that there is not a month in the year in which I have not taken eggs or found nestlings more or less callow. I have never seen any Indian eggs of the Alpine Swift, but Mr. Davidson, of Malligaum, showed me both nests and nestlings which he had obtained from the mountains in that district. He says that the birds breed in deep clefts and fissures of almost inaccessible rocks. On several occasions he made attempts to secure their eggs. These places are always inaccessible from below, and generally it is impossible to get on the cliffs above them, so as to be able to let down a rope. In one or two places, however, they breed on cliffs, above which people can walk with safety, and the Bheels get down to them in the same way as they do to take honey. A rope ladder is constructed of pieces of bamboo about fifteen inches long, tied between two strong ropes, which are fastened to a very thick rope. The steps are two and a half feet apart, so that a long ladder does not weigh very much. The thick rope is tied to a tree if possible, if not it is held by a number of men and the rope ladder hung over the precipice. A Bheel then ties a light rope under his arms, and with the end held by people above who pay out the rope, runs down the ladder which swings about in the wind. In taking the nest of the Alpine Swift, however, the difficulty lies in the fact that they breed in fissures stretching upwards into overhanging cliffs. Many of these places the man cannot get at, or even if he can the nests are out of his reach. During the rains the people refused to try at all, on the ground that at that season the overhanging cliff would probably fall on them. The specimen of nest shows where it was fastened to both sides of the fissure. It is a very solid structure in comparison to that of the Common Indian Swift. The Palm Swift is, as I have already said, found throughout the plains of India, wherever the toddy tree

abounds, and it is to the under-surface of a leaf of this tree that they attach their tiny nests. They are composed of fine vegetable down, cemented together by the saliva of the birds. The upper edge of the rim of the nest (which in shape resembles a watch pocket) is generally very hard and cordlike, but the remaining portion of it is much softer. The eggs, three in number, are perfect miniatures of those of the Common Swift. They are solitary builders, as a rule, generally not more than one or two nests being found on the same tree. The Palm Roof Swifts (*Cypsellus infumatus*) are stated by Dr. Jerdon (I have myself never seen one), to attach their nests to the palm leaves, used by the people in the Naga Hills to roof their huts. The roofs consist of two separate layers, and it is to the upper surface of the lower layer that the nests are attached. One of the Edible Nest Swiftlets (*Collocalia unicolor*) breeds in several places on the Nilgiri Hills, as also on the Vingorla Rocks, from whence it is stated that one hundredweight of nests are exported every season. These nests are, however, much inferior in value to those of *C. linchi* and *C. spodiopygia*, which are clear white. Both kinds are, however, esteemed a delicacy in China and fetch there a good price. I will conclude my remarks with an account of the nesting of, perhaps, the most interesting bird of all. I allude to the Crested Tree Swift (*Dendrochelidon coronata*), which makes its nest against the side of a dead branch, in shape like a very shallow half saucer, which can easily be covered by a depreciated rupee, and it is nowhere more than one-eighth of an inch in thickness, and is barely half an inch in depth. As might be expected, a single egg only is laid, which is of a pure glossless white. The nest itself is composed of thin flakes of bark glued together with saliva.

My object has been to give a plain description, or rather account, of the nesting habits of these, to me, interesting birds, and I have avoided the use of scientific and technical terms as much as possible.

CATALOGUE

OF THE SNAKES IN THE SOCIETY'S COLLECTION.

| Families. | | Genera and Species. | Locality. |
|--|-----|---------------------------|---------------------|
| I.—Typhlopidae .. (Blind Snakes.) | 1 | Typhlops porrectus | Bandora, Bombay. |
| " | 1 | " " | Cutch. |
| " | 1 | " brahminus | Mauritius. |
| " | 1 | " " | Poona. |
| " | 1 | Onychocephalus acutus... | Neemuch. |
| " | 1 | " " | Carwar. |
| " | 1 | " " | Alibag, Kolaba. |
| II.—Tortricidae .. (The Short-tail ed Earth Snakes) | 1 | Cylindrophis maculatus .. | Ceylon. |
| | 1 | " rufus | Henzada, Burmah. |
| III.—Pythonidae .. (The Pythons) | 1 | Python molurus | Lanowli. |
| " | 1 | " " | Bombay. |
| " | 1 | " " | Carwar. |
| " | 1 | " reticulatus | Mergui Archipelago. |
| " | 1 | " " (juv.)... | Moulmein. |
| IV.—Erycidae..... (The Sand Snakes) | 1 | Gongylophis conicus | Bombay. |
| " | ... | " " | " |
| " | ... | " " | Saugor, C. P. |
| " | ... | " " | Hingoli, Deccan. |
| " | ... | " " | Poona. |
| " | 1 | Eryx Johnii | Bombay. |
| " | 1 | " " (juv.) | " |
| " | ... | " " (juv.) | Poona. |
| V.—Acrochordidae .. (The Wart Snakes.) | 1 | Chersydrus granulatus ... | Bombay Harbour. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| VII.—Uropeltidae .. (Rough-tailed Earth Snakes.) | 1 | Silybura Elliotii | Belgaum. |
| " | 1 | " bicaenata | Poona |
| " | 2 | " macrolepis | Khandalla. |
| " | 2 | " " | " |
| " | 1 | " Shortii | Lanowli. |
| VII.—Zenopelti- dae. (Iridescent | 1 | Xenopeltis unicolor | Henzada, Burmah. |
| Earth Snakes) | 1 | | |
| VIII.—Calamari- dae. (Dwarf Snakes.) | 1 | Aspidura trachyprocta ... | Ceylon. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " (juv.)... | " |
| IX.—Homalopsi- dae. (River Snakes) | 1 | Feronia sieboldi | Saugor, C. P. |
| " | 1 | " " | " |
| " | 1 | " " | " |

| Families. | | Genera and Species. | Locality. |
|---|---|-----------------------------------|-----------------|
| IX.—Homalopsi- dæ—(contd.) | 1 | <i>Cerberus rhynchops</i> | Bombay Harbour. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " (juv.) | " |
| " | 1 | " " (juv.) | " |
| " | 3 | " " (juv.) | Carwar. |
| " | 1 | <i>Ferdonia unicolor</i> | Moulmein. |
| " | 1 | " " | " |
| " | 1 | <i>Hipistis hydrinus</i> | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| X.—Amblycepha- lidæ. (Blunt-headed Snakes.) | | None. | |
| XI.—Oligontida (Filleted Ground Snakes.) | 1 | <i>Oligodon subgriseus</i> | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | Deolali. |
| " | 1 | " " | " |
| " | 1 | " " | Colaba. |
| " | 1 | " " | Khandalla. |
| " | 1 | " " | Ceylon. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | Carwar. |
| " | 1 | " " | " |
| " | 1 | <i>Oligodon sublineatus</i> | Ceylon. |
| " | 1 | " <i>spilonotus</i> | Bombay. |
| " | 1 | " <i>subpunctatus</i> .. | Lanowli. |
| " | 1 | " " | " |
| " | 1 | " " (juv.) | Poona. |
| " | 1 | " <i>fasciatus</i> (juv.) .. | Bombay. |
| " | 1 | " " (juv.) | Poona. |
| " | 1 | <i>Simotes Russellii</i> | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | Carwar. |
| " | 1 | " " (juv.) | " |
| " | 1 | " <i>laniatus</i> | Burmah. |
| " | 1 | " " | " |
| XII.—Lycodonti- dæ. (Harmless-fang- ed Snakes) | 1 | <i>Lycodon anlicus</i> | Thanna. |
| " | 1 | " " | Bombay. |
| " | 1 | " " | " |
| " | 1 | " (Ceylon variety) .. | Ceylon. |
| " | 1 | " " | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | Ceylon. |
| " | 1 | " " | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | Poona. |
| XIII.—Colubridæ | 1 | <i>Cyclophis calamaria</i> | Ceylon. |
| Group 1.—Coronel- lina. | 1 | " " | Mahableswar. |

| Families. | | Genera and Species. | Locality. |
|----------------------|---|-------------------------------------|---------------|
| (Ground Colubers) | 1 | <i>Cyclophia calamaria</i> | Mahableshtar. |
| XIII.—Colubridæ. | 1 | <i>Ptyas mucosus</i> (head) ... | Bombay |
| Group II.—Colubrina. | 1 | " " " | " |
| (Agile Colubers.) | 1 | " " (juv.) | " |
| " | 1 | " " (juv.) | " |
| " | 1 | " " (juv.) | " |
| " | 1 | " " foetus in egg | " |
| " | 1 | " " " | " |
| " | 1 | <i>Zamenis diadema</i> | Campbellpore. |
| " | 1 | " " " | Bhoj, Cutch. |
| " | 1 | " <i>fasciolatus</i> | Thanna. |
| " | 1 | " " " | Khandalla. |
| " | 1 | " " " | Saugor, C. P. |
| " | 1 | " " " | Poona. |
| " | 1 | " <i>ventrimaculatus</i> . | Perim Island. |
| " | 1 | " " " | Campbellpore. |
| " | 1 | <i>Cynophis Helena</i> | Ceylon. |
| " | 1 | " <i>Malabaricus</i> ... | Mahableshtar. |
| " | 8 | " " " | Khandalla. |
| " | 1 | " " " | " |
| " | 1 | " " (juv.)... | Lanowli. |
| " | 1 | " " " | Khandala. |
| XIII.—Colubridæ. | | | |
| Group III.—Dryadina. | | None. | |
| (Bush Colubers) | | | |
| XIII.—Colubridæ. | 1 | <i>Tropidonotus quincunciatus</i> . | Bombay. |
| Group IV.—Nalricina. | 1 | " " " | " |
| (Amphib. Colubers.) | 1 | " variety ... | Ceylon. |
| " | 1 | " " " | Mahableshtar. |
| " | 1 | " (foetal specimen in egg) | Bombay. |
| " | 1 | " (juv.) | Poona. |
| " | 1 | " <i>stolatus</i> | Bombay. |
| " | 1 | " " " | " |
| " | 1 | " (foetal specimen in egg.) | " |
| " | 1 | " " " | " |
| " | 1 | " " " | Poona. |
| " | 1 | " <i>platyceps</i> | Thundiani. |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " <i>plumbicolor</i> ... | Saugor. |
| " | 1 | " " " | Kirkee. |
| " | 1 | " " " | " |
| " | 1 | " " " | Carwar. |
| " | 1 | " " " | Deolali. |
| " | 1 | " " " | Poona. |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " <i>Beddomii</i> | Mahableshtar. |
| " | 1 | " " " | " |
| " | 1 | " <i>punctatus</i> | Alibag. |
| " | 1 | " " " | " |

| Families. | | Genera and Species. | Locality. |
|--|-----|---------------------------------------|-------------------|
| XIV.—Dendrophidæ. (Tree Snakes.) | 1 | <i>Chrysopelen ornata</i> | Ceylon. |
| " | 1 | " " | Carwar. |
| " | 1 | " " (juv.) | " |
| " | 1 | <i>Dendrophis picta</i> | Surat. |
| " | 1 | " " | " |
| " | 1 | " " | S. Travancore |
| XV.—Dryophidæ. (Long-nosed Tree Snakes.) | 1 | <i>Passerita mycterizans</i> ... | Thanna. |
| " | 1 | " | Bombay. |
| " | 1 | " | " |
| " | 1 | " | Ceylon. |
| " | 1 | " | Poona. |
| " | 1 | " | Carwar. |
| XVI.—Dipsosidæ. (Brown-headed Tree Snakes.) | 1 | <i>Dipsas gokool</i> | Saugor. |
| " | 1 | " " | Rutnágiri. |
| " | 1 | " " | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | Poona. |
| " | 1 | <i>Dipsas Ceylonensis</i> | Alibag, Kolaba |
| " | 1 | <i>Dipsas trigonata</i> | Poona. |
| XVII.—Psammophidæ. (Desert Snakes.) | 1 | <i>Psammophis Leithii</i> | Campbellpore. |
| XVIII.—Elapidæ. (Venomous Colubrine Land Snakes.) | 1 | <i>Naga tripudians</i> | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " (fœtus in egg) | " |
| " | 1 | " " (juv.) | " |
| " | 1 | " " (juv.) | " |
| " | 1 | " " (Keautiah). | Heenzada, Burmah |
| " | 2 | " " (juv.) | Poona. |
| " | ... | <i>Bungarus fasciatus</i> | Heenzada, Burmah. |
| " | 1 | " " | " |
| " | 1 | " <i>arcuatus</i> | Bombay. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | Saugor, C. P. |
| " | 1 | " " | Ahmedabad. |
| " | 1 | <i>Ophiophagus elaps</i> (head) | Carwar. |
| " | 1 | " " (skin). | Canara, (15-5). |
| " | 1 | " " | Penang. |
| " | 1 | <i>Callophis nigrescens</i> | Mahableshtar. |
| " | 1 | " " | Carwar. |
| " | 1 | " <i>trimaculatus</i> ... | Colaba, Bombay. |
| " | 1 | " " | Baudora " |
| XIX.—Hydrophidæ. (Sea Snakes)..... | 1 | <i>Hydrophis curta</i> | Persian Gulf. |
| " | 1 | " " | Bombay Harbour. |
| " | 1 | " " | Porobunder. |
| " | 1 | " <i>robusta</i> | Alibag |
| " | 1 | " <i>diadema</i> | Bombay Seas. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " <i>aurifasciatus</i> ... | Persian Gulf. |
| " | 1 | " <i>bicolor</i> | Bombay Seas. |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |
| " | 1 | " " | " |

| Families. | | Genera and Species. | Locality. |
|---|---|------------------------------------|--------------------|
| XIX.—Hydrophi- dæ— <i>contd.</i> | 1 | <i>Hydrophis bicolor</i> | Bombay Seas. |
| " | 1 | " <i>Phipsoni</i> | " |
| " | 1 | " <i>Guntherii</i> | Katrywar Coast. |
| " | 1 | " <i>cloris</i> | Bombay Seas. |
| " | 1 | " " " | " |
| " | 1 | " <i>Lindsayi</i> | " |
| " | 1 | <i>Echydria bengalensis</i> .. | " |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| XX.—Crotalidæ.. (Crotali or Pit. Vipers.) | 1 | <i>Trimacrus trigenocephalus</i> . | Ceylon. |
| " | 1 | " " " | " |
| " | 1 | " <i>anamallensis</i> | Khandalla. |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " " (head) | " |
| " | 1 | " <i>carinatus</i> | Moulmein. |
| " | 1 | " <i>strigatus</i> | Carwar. |
| " | 1 | <i>Hypnale nepa</i> | " |
| " | 1 | " " " | " |
| " | 1 | " " " | Ceylon. |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " " " | Carwar. |
| " | 1 | <i>Halys himalayanus</i> .. | Thundiani, Punjab. |
| " | 1 | " " " | " |
| XXI.—Viperidæ. (Vipers.) | 1 | <i>Daboia elegans</i> | Sanger, C. P. |
| " | 1 | " " (head) | Murda, C. P. |
| " | 1 | " " " | Bombay. |
| " | 1 | " " " | " |
| " | 1 | " " " | Ceylon. |
| " | 1 | " " " | " |
| " | 1 | " " " | Bombay. |
| " | 1 | <i>Echis carinata</i> | Sind. |
| " | 1 | " " " | Bhoj, Cutch. |
| " | 1 | " " " | Mahableshwar. |
| " | 1 | " " " | Rutnagiri. |
| " | 1 | " " " | " |
| " | 1 | " " " | " |
| " | 1 | " " " | Aden. |
| " | 1 | " " " | Ceylon. |
| " | 1 | " " " | Kirkee. |
| " | 1 | " " " | Hingoli. |
| " | 1 | " " " | Poona. |

H. M. PHIPSON,

Hon. Secretary, Reptile Section.

1st January 1888.

THE "FOLKLORE OF INDIAN PLANTS."

THE following is a report of the lecture on the above subject given by Dr. Kirtikar at the Sassoon Mechanics' Institute on Monday, the 9th January 1888:—

From time immemorial plant life has always had its tales connected with itself or with the places in which it grows. In ancient Grecian and Roman literature we find that there are certain plants favourite to certain gods and goddesses. Bacchus is described as ivy-clad. Æsculapius, the god of the physicians and physic, wears a crown of laurel, because the tree is supposed to be a powerful cure for disease of all kinds. The goddess Concordia (concord) has her symbol illustrated by two right hands joined together and a pomegranate. Pax, the goddess of peace, is represented as being crowned with olives and laurel, bearing ears of corn in her hands. Pluto, the king of the nether regions, is represented as being sometimes crowned with Narcissus flowers (white daffodils), and sometimes with cypress leaves. The god Hymenæus, presiding over marriages, and companion of Venus, is crowned with sweet marjoram, and sometimes roses. Who can read without horror the experience of Æneas as has been graphically portrayed by the masterly pen of Virgil, when Æneas on landing on the Thracian shore plucks a shoot of what is apparently a shaggy myrtle bush! Drops of dark blood arise from where the shoot was torn off the ground. He did it again, and again did blood ooze out of the upturned soil. At last a voice arose from the bosom of the soil "Spare me! I am Polydorus, buried here. Let me enjoy repose in my grave, murdered as I lie by the hand of a Thracian monarch, who killed me for my gold." Take another instance from classic legends, when Phaeton, one of the children of the Sun, mounted his father's chariot, and being unable to manage the fiery horses, set fire to heaven and earth, Jupiter struck him out of the chariot with thunder, and cast him headlong into the river Po. Phaeton's sisters mourned over the loss of their brother, and wept uncontrolled by the side of the river. The gods in their compassion changed the sisters into *poplar trees*. Proserpine, the queen of the infernal regions, loved her husband Pluto—the *black* god so much, *lovely as she was*, that she in a fit of jealousy converted his mistress *Mentha* into *mint*, a plant known after her name. We know again the story of the youth Narcissus who was so infatuated with his own beauty that he fell in deep love with himself. In the love of his

own matchless beauty he pined away, when at last the compassion of gods turned him into a daffodil. In our own day we speak of "successful" men bearing the palm, from the ancient Roman custom of giving the gladiator a palm tree branch. Our leading poet is called the "Poet Laureate." The laurel is an emblem of peace and victory in our day. In modern days our flowers have a language, which finds no small pleasure, encouragement, and fruitful occupation to two young loving hearts about to be united in the sacred bonds of wedlock. The lady love sends a beautifully pressed dried heart's-case. The sweetheart swears constancy and warmth by enclosing a rose. The lady-love sends a lily-of-the-valley—the sweetheart sends back love-lies-bleeding, and so on till the orango blossom veil hands over the virgin wife to her ardently admiring husband. Nor is the village tree, or the way-side bush, free from its own tale. Near Glas-tonbury Abbey they say there is an old hawthorn tree that sprang up and at once threw out bud and blossom, when Joseph, the first preacher of Christianity in Britain, thrust his staff into the ground to convince the British Islanders that he had a divine mission to fulfil. They all sing its praises. India is no exception to this universal natural propensity of the human mind to connect tales of more or less interest with the trees and plants we see around.

Have you seen the peepul (*Ficus religiosa*) tree yonder? It is dusk now. Don't you pass by it. Don't stand under its rustling branches, or you will be possessed of the spirits that haunt its deepening shadow. Why should the peepul more than any other tree, say its neighbour the acacia or babul, be haunted by spirits? There is no more reason for this than there is for young Narcissus being looked upon as turned into a daffodil in preference to a rose. Nobody has seen these spirits in *propriâ personâ*. It is all imagination. Good spirits, according to other accounts, dwell on the different parts of the peepul. Thus Bramhâ, the creator of men, is at the place where the roots strike the ground; Vishnu, the preserver, is at its middle; and Shiva, the destroyer, is at the top. The ghosts, or evil spirits, are supposed to haunt the branches. It is possible that the idea of evil spirits has struck the story-teller's mind from the topmost deity being inordinately fond of the company of goblins or demons. What are these demons? Principally there are two—the *Hedli*, a female, and the *Munjâ*, or an unmarried youth, a boy under or about twelve. The *Hedli* is a ghastly figure, being the spirit of a married woman dying during the lifetime of her husband. She is

dressed in a yellow *sâri*. Her hair is dishevelled, her forehead besmeared with red powder, and her eyelashes darkened with lamp-black. She has the appearance of wildness, and her general demeanour betokens mischief, for death has been early, and the woman has died before properly enjoying the world. The youthful *Munjâ* is not so wild, having died before he was old enough to appreciate a worldly life. The spirit *Munjâ* is at the best an indifferent spirit. He is dressed in the fashion suited to his age and calling. His age is boyish. He has just passed through the ceremony of the investiture of the holy thread, but has died before the sacred girdle is off his waist. He is nude, he carries with him a staff obtained from the palas tree (*Butea frondosa*). He has the recently assumed sacred thread across his left shoulder. He has his water bowl and his *jholi*, or bag, to receive the alms he asks to sustain his body during the period of his pupilage. Why such a tender and harmless spirit should ever have been created by the story-teller beats my imagination. I can understand an angry, unsatisfied grown-up person, male or female, being anxious to linger around the place dear to him or her during life, and being angry and dissatisfied, they might wear countenances horrid enough to terrify those whom they haunt; but I cannot understand this of a boy, whose spirit, after his boyish frolics, requires rest and peace, or whose lissome countenance wants a more congenial home than the constantly rustling branches of a shady peepul. There is no botanical reason why the peepul should be haunted by evil spirits. In Bombay it grows rather irregularly, but up-country I have seen its stem as perfect and erect, beautifully shining as it could be. The leaves lovely, delicately tinted, perfect in their frame work, and altogether when the stem is not irregular it is a lovely tree, though not productive of any edible fruit. The presence of the Hindoo trinity gods, therefore, is more suited to the general appearance of the peepul.

Far different in appearance is the *Umbar* tree, botanically called the *Ficus glomerata*, at the foot of which the guardian deity is *Dattâtraya*. The legend of the birth of this peaceful, all-powerful, and all-protecting deity is highly amusing. You already know the gods of the Hindoo trinity. Let me introduce to you their wives: Sâvitri, wife of Bramhâ; Lâkshmi, wife of Vishnu; and Pârvati, wife of Shiva. These three dutiful wives are extremely devoted to their respective lords. The story is that there was a certain saint called Atri, living happily with his devoted wife Anusayâ. Though the

wives of the gods forming the trinity wore highly devoted to their respective husbands, it must be stated that Anusayâ far surpassed any known woman of her time in her devotion. Her entire submission to the will of her lord was well known. If ever, therefore, there was an object of universal envy in this respect, it was the wife of the humble saint Atri. He was powerful in his sanctity, and peaceful at home, not possessing much and yet wanting little. Rich in the love of his wife, he was the happiest among the living. Any god or goddess not quite at peace with his or her partner might have usefully learnt a lesson from their singularly pure and perfect lives. The gods of the Hindoo mythology, like all other mythic gods, were not perfect gods. They had their own domestic vexations. With a view, therefore, to have some "fun" the heavenly peripatetic chatterer *Nârad* appears on the scene. Who is *Nârad*? As I say, he is a peripatetic chatterer,—a messenger travelling between the heavenly and mundane spheres, a walking newspaper, a living encyclopædia, and a mellifluous singer like Orpheus of the Greeks. He is an energetic bachelor, carrying the *Vinâ* (or a kind of modified guitar) in one hand, and the *chiplyâ* in another (two chips of wood with brass jingles held between the middle finger and thumb and struck against each other, keeping time as the *Vinâ* is being played upon); singing and dancing, full of liveliness and full of glee. He is a man the very quintessence of wit and humour and of vast resources, ready to create misunderstandings between friends and companions, and foment quarrels between foes, and as equally ready with means, repairing wrongs resulting therefrom,—in plain words, a consummate peace-breaker and mischief-maker, the very imp of meddlesomeness, the minion of mockery, and with all this, a *saint* born and brought up—and what is more strange, an *ever-welcome* visitor of the immortal gods and mortal men, at whatever hour of night or day he paid his visit! He had the power of mysteriously disappearing from the lower to the higher world, and had no vehicle to carry him from place to place. He vanished in the airy regions, but when he was not disposed to be *incognito* the sweet strains of his ever charming music announced his arrival. True to his calling he paid a visit to each of the wives of the three gods I have mentioned—Brahmâ, Vishnu, and Shiva. He said to them that there was a woman in an humbler sphere of life who beat them all in her devotion to her lord and in her hospitality. It was not meet, said he, that it should be so. It was a disgrace to them that they of heaven were surpassed. What

could this chaff and banter of Nārada's do but rouse the green-eyed monster? The virulence of the jealousy of his fair listeners was boundless. They determined to try Anusayā and to test her sense of hospitality, and so they packed off their husbands to the dwelling-house of this holy and humble pair. Leagues away they went, Brahmā from his Satyaloka, Vishnu from Vaikunth, and Shiva from Kailās, influenced by the entreaties of their wives. They stood as beggars at the door of Atri, asking alms, but imposing an absurd condition that the alms should be given by the lady of the house, Anusayā, in a state of perfect nudity. This is palpably a prohibitive condition imposed with the sole object of putting to the severest test the hospitality of the host, under the strong presumption that it will not be fulfilled, the rules of hospitality will thereby be broken and the object of the trinity eventually gained. The story reminds one of Lady Godiva, the noble wife of the "grim Earl" of Coventry, who was called upon to ride uncovered through the town, if she wanted her hard-hearted husband to repeal an oppressive law, and thus save her subjects from heavy taxation. To return to our legend, then. The Hindoo trinity thus stood at the Rishi's door united in an act of self-immolation—for indeed self-immolation it was—as they were demanding more than was their due as beggars or as guests, and though they were supreme gods *incognito*, their act was one which no mind, human or divine, could ever look upon with approbation or with complacency, under any circumstance—far less would such a request be considered becoming on the part of guests and beggars. But beggars have sometimes strange ways of demanding alms. A woman's true dowry is modesty. To venture to attack that under the garb of hospitality, to make one's own demand as a guest, forgetting the commonest and plainest rules of hospitality, is too much to bear for even a saint. Yet the husband of Anusayā was up to the occasion. Embarrassed, yet serene and unmoved, "sweet as the primrose peeps beneath the thorn," Anusayā, the faithful wife and woman, says to the three guests "your will be done!" To send them away unsatisfied would be a life-long reproach. It would entail the loss of merit of former hospitalities. It would mean a life of moral extinction. Her husband in the meanwhile placed a potful of charmed water before his devoted wife, dignified in what to others would have been perturbation, but determined as a true woman always is, to do her duty to the last. The lady sprinkled a little of this charmed water prepared by her

husband on each of the pseudo-beggars, and if I may venture to express an opinion, it "served them right." For, behold! on the sprinkling of the water they three lost their manly forms and became tender *babies*. They were there in spirit, but their persons were no longer those that could take impression from the surrounding world. The lady Anusayâ thereafter at once fulfilled the condition of nudity, flung her garments aside, and with a dignity characteristic of a hostess she put the three babies to her breast, one after another, and fed them in their state of perfect innocence, thus fulfilling their demands without going beyond the bounds of modesty. She sang lullabies and sent the babies to sleep. Time passes. The husbands don't return home. What's become of them? *The Messenger of Heaven, Nûrad*, is again on the scene. He knows it all. He is at the bottom of it. He informs the three wives, anxious about the return of their gallant husbands, that their husbands had been metamorphosed into babies, and were now in the arms of Anusaya, whom they had sent a trial. The laurel is the meed of mighty conquerors. The cradle is now the meed of these preposterous gods. You can imagine the consternation of the wives. Implorings and apologies of a touching kind prevailed after this. The time for claiming superiority was gone. The contest was at an end. There was a fall, and the humble pair was victorious. The *Rishi* was willing to forgive and forget. The charmed waters were sprinkled over the babies, and they became men again. To mark the circumstance, however, and also to serve a lesson to future generations, this united action of the three gods was symbolized in making a new deity by the union of three persons into one. This was the birth of god *Dâttatraya*, who is to be found at the foot of the *Umbar* or *Audumbar tree (Ficus glomerata)*. He has only one body and six hands, but has three different heads, each representing a god of the Hindoo trinity. He was conceived in holiness and in the discharge of the solemn duty of hospitality, and is therefore a noble deity, the prince of peace, and guardian of good deeds.

Let me now take up the legend connected with another favourite and frequently seen tree, the banyan tree, the *Ficus religiosa*. On the full moon day of Jeshtha this tree is worshipped by all married ladies that they may escape the miseries of a widowed life. The story is that it was the worship of this tree that gave back to Savitri her husband Satyawân, who was stung to death by a cobra during his wanderings in the forest. The legend of Savitri has attracted the attention of

Count Gubernatis, that distinguished Oriental scholar who was among us some time ago. He has dramatized the story in Italian, which our learned antiquarian scholar, Dr. Gerson DaCunha, has rendered into English. There the story is given graphically though different from mine. Suffice it to say here, that Nārada figures in this story also. Here it was through his instrumentality that Savitri knew the mode of recovering her husband from the Yama Rajah, King of the Infernal Regions (the Indian Pluto). After having worshipped the plant in the usual manner prescribed by the ritual, standing by the side of her husband's body that had just breathed its last, she invoked the lord of the nether world that her husband's life might be restored. The force of the worship of the banyan tree was so great that the King of Hell was obliged to give up the spirit of the deceased husband. It was no unmerited reward to a dutiful wife who had abandoned her parents and all her dear belongings, her country, and her comforts, to wander in the jungles with her husband—a companion in life to him as well as his deliverer, or regenerator after death. What woman with her beliefs trained in this direction, will not similarly worship a banyan tree if it is only to escape the sorrows and miseries of a widowed life? And yet how many an Indian woman is there at this day who has most devoutly worshipped the banyan every year with renewed faith, and yet in the end not escaped the crushing calamities of perpetual and relentless widowhood! If it had been in the power of plants and bushes to avert human sorrow and lessen the burden of human misery, the world would have been different! There would have been no misery at all.

There are two or three plants which are connected with the life history of the amorous god Krishna. They are the 'Tulsi' (*Ocimum sanctum*), Kadamba (*Nauclea Cadamba*), and Pārijatak (*Nyeanthus Arbor-Tristis*). The mythological character of Krishna is one of the most marvellously complex that has ever been created, or even attempted by any classical or modern writer. It is the leading character of the great epic of the Mahābhārat. The mainsprings of his action are not simply dictated by a life of sensual pleasure, but if I may speak as a student of poetry, some parts of the life of Krishna afford an illustration of undying personal attachment to his devotees and astounding self-sacrifice in the interest of those who trusted in him.

The birth of the Tulsi plant has a story of its own. The plant wherever it grows or exists, assures us of the presence of Vishnu, and

Krishna being one of the incarnations of Vishnu (8th), his presence is identically constant in the plant. There is a day in the month of Kârtik, the 11th day in the first fortnight of the month when the Hindoos celebrate a wedding of the image of Krishna and the Tulsi plant. This plant is held in great veneration by the ladies particularly. It is worshipped every morning by those devout Hindoo ladies, who observe their ancient customs rigidly. After worshipping they go round the pot, in which the plant grows, a hundred times, or a thousand times, and in rare instances, on exceptional occasions, a hundred thousand times. Thus indirectly those who go through this apparently meaningless worship, get the opportunity of taking exercise of an early morning regularly, ending in a measure which is conducive to health. However that may be, whether the Tulsi plant is worshipped or not it exists, or at any rate ought to exist, in the backyard or front of a Hindoo's house, or among his collection of plants if he has any. The story told about the birth of this plant is this:—At the time of the churning of the great ocean, when fourteen jewels came out of the ocean, the goddess "Lakshmi," the gem "Kaustubh" and the plant "Pârijat" fell to the lot Vishnu, who, as I have already said, formed one of the trinity. The god was so overjoyed, that tears came out of his eyes, trickled down his cheeks and fell on the ground. From every drop of these tears sprang a plant of Tulsi. There is yet another account of the origin of this plant given very graphically by a writer in one of the recent numbers of the *Indian Antiquary*. I may summarize the story briefly as I have heard it. The wife of a deity, named Jalandar, conceived a secret affection for Krishna. Silently loving him, she pined away—and eventually died without a reciprocation of her attachment from Krishna. After her death he realized the extent of her affection, and mourned sorely over the unrequited love of his admiring friend. But it was no use. Her body had been burnt. Her angelic form had disappeared "earth unto earth and dust unto dust." Ashes alone had remained. What could Krishna do but weep? It was too late for anything else. He threw himself down on the hot ashes of the broken-hearted woman, and wept bitterly in the deep agonies of disappointment. From every drop of his tear, it is said, arose a Tulsi plant. This story appears to better account for the annual marriage of the god with the Tulsi plant, whereby he is united in spirit with the symbol of her that had loved him fervently

but fruitlessly in life, and had, alas too late! gained in death the fruit of her secret affections.

The story of the *Kadamba* tree is a very amusing one. Krishna found the Gopis—his female friends—bathing in the river Jumua one day. He appeared unseen on the spot, and carried away their garments, which he left hanging on the Kadamba tree. What consternation this must have caused among the temporary losers of the garments had better be imagined than described. It is a terrible joke to practise on any body. But Krishna was full of all sorts of pranks and practical jokes.

The story of the *Pârijatak* plant is equally characteristic of the character of Krishna. I have already said that the *Pârijatak* plant was one of the fourteen gems obtained from the great churning of the ocean, and that Vishnu had become the happy possessor of this sweet-scented tree. Here, again, let me bring Nârada on the scene to help my story. He happened to have a flower from this tree which he had brought from the Paradise of Vishnu, and presented to Krishna. In his deep devotion to Rukmini, Krishna presented the flower to her in preference to any other wife of his. This shows the disadvantage of having more wives than one. The news seems to have reached the ears of Satyabhâmâ, another dear wife of his. Who do you think was the bearer of this tale to Satyabhâmâ? Why? Nârada, of course. His restless soul would not remain quiet with simply presenting a rare sort of a flower to a deity he was visiting. One mischief must supersede another. How else are mischievous persons to find an occupation for themselves? What is the result of this report to Satyabhâmâ of the gift of a flower of *Nyctanthes* from Krishna to Rukmini? Satyabhâmâ is electrified. Her lord Krishna, she feels, has slighted her. She is mightily offended. She is disconsolate. Nothing will please her; nothing will pacify her. How dared Krishna thus ill-use her? She can't explain. Has she been wanting in her duty, or has Krishna forgotten his former professions to her, or has Rukmini got the better of her lord? She must not remain silent now. Krishna must know from her how grievous her wrong has been. On his next visit to Satyabhâmâ, Krishna finds the door of her chamber locked up from within. No answer from her to his knocks. The unsuspecting husband knows of no cause, for he has given none for such treatment. He is unsuspecting because he does not know that the chief mischief-maker on this occasion is

the peripatetic Nârad. To return to the story. The door of the chamber was at last opened to the repeated entreaties of the knocker outside. On entry there was a scene, and on explanation of the cause of anger, followed by apologies, coupled with much persuasion on the part of Krishna, Satyabhâmâ was at once promised, not only a flower of the tree, but the whole tree itself. The tree (root stem, and branches all) was bodily transferred from Satyaloka by a messenger specially sent there to the garden of Satyabhâmâ. But the story would not be complete if I did not tell you the sequel of it. Satyabhâmâ, full of pride, gathered therefrom a few flowers and sent them in a golden case as a present to Rukmini, her rival in love, through her ladies-in-waiting. It so happened that Krishna having originally presented the flower to Rukmini, the Winds of the air had known the first bent of his mind, and had accordingly daily wafted abundance of *Pârijâtak* flowers from the garden of Satyabhâmâ into the garden of her rival Rukmini, so that when Satyabhâmâ's ladies-in-waiting arrived at Rukmini's house with the golden casket of a few stray flowers, they found their mistress's rival, much to their surprise, rolling in a bed of the flowers ! Their discomfiture was great. This news was duly communicated by the ladies-in-waiting to Satyabhâmâ. Thus her haughty spirit had a fall. She had to acknowledge, in her heart much against her wish, that she had only the second place in the heart of Krishna.

There is supposed to be a time when once in the year during the Dewali holidays, on the 14th dark night of the month of Ashvin, the plants in the jungles speak and give information to herbalists wandering in the jungles. I have never wandered in the jungles at night, and certainly I would not do so on the principal night of Dewali, for, like Christmas, Dewali comes but once a year, but if ever I do, I am doubtful if I should understand the language of plants. There is, however, yet a sphere of usefulness for anybody that wanders the jungles in India by day ; he may gather the herbs and simples, and he may assist in the work of renovating the Bombay flora. There is infinite variety in nature. "Age cannot wither her, nor custom stale her"; we may be able to examine old plants with new eyes, and we may be able to identify and classify the vast flora that yet lies insufficiently explored before us in this gorgeously green country and superbly rich soil.

ZOOLOGICAL NOTES.

PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,

PARTS I., II. AND III. OF 1887.

As the proceedings of the Zoological Society of London are not easy to get at in this country for others than the Bombay members of the Society, the following notes of the contents of the first three parts issued in 1887, as far as they refer to this part of the world, may be of interest:—

Part I. notices the addition of the larger one-horned rhinoceros (*Rhinoceros unicornis*) to the Society's menagerie, presented by H. H. the Maharajah of Cooh Behar. There is an interesting article on the habits of the "Tree Trapdoor Spider of Graham's Town," which though not referring to the East, yet is of general interest; hence its mention here: also descriptions and plates of certain Coleoptera of Ceylon, collected in 1881-82: also a report on some Echinodermata from the Andamans, by Professor Bell, followed by an article with plates on a collection of Reptiles and Batrachians from the Loo-Choo Islands

Part II. opens with a note on a Batrachian of the genus *Cacopys* (*C. globulosus*) sent by Mr. Thurston of the Madras Museum, who wrote: "On opening the visceral cavity, which was enormously distended, the distension was found to be caused by the presence of a mass of winged white ants, which when dried weighed 326 grains." The first article is an interesting one on the "Experimental Proof of the Protective Value of Colour and Markings in Insects in reference to their Vertebrate Enemies:" it spreads over 84 pages, full of particulars of many experiments. A letter from the Rev. G. Fisk, C. M. Z. S., of Capetown, was read at the meeting held on the 5th April, giving an account of how a mouse killed and ate a poisonous snake, or more correctly two; they were "young 'Ringhals,' probably from 7 to 14 days old."

In Part III. Mr. Sharpe contributes some remarks on a collection of Birds from Perak, followed by a description of some new Lepidoptera from Sikkim by H. J. Elwes, viz., *Lethe tristigmata*, *Zophoesa mülleri*, *Chilades (?) pontis*, *Chilades sinensis*, *Nipolycæna virgo*, and *Saturnia royi*. We then find a "Description of some new and little known Indian butterflies, with notes on the Seasonal Dimorphism obtaining in the genus *Melanitis*, by L. de Nicéville, F. E. S." Nineteen butterflies are figured. At the May meeting Mr. Sharpe read some notes on Specimens in the Hume Collection of Birds. This is No. 5 of these notes, and is on *Syrnium maingayi*.

At the June 7th meeting were read some remarks by the well-known A. O. H. on the Gnu Goat on Takin (*Budorcas taxicolor*); three horns are figured.

At the June 23rd meeting, a pheasant, *Phasianus komarovi*, from North Afghanistan, presented by Sir Peter Lumsden, was exhibited. A paper was read on a zoological collection made at Xmas Island, Indian Ocean; it is well worth noting that "unfortunately one of the most interesting portions of the collection, viz., the Lepidoptera, was destroyed on its way home, some pieces of camphor having become loose and smashed all the specimens but two." This paper is illustrated.

E. F. B.

CORRESPONDENCE.

CAN SNAKES HEAR?

TO THE EDITOR OF THE "ASIAN."

SIR,—Absence from home prevented my writing earlier anent this interesting subject. I do so now, but before proceeding I may say that I fully agree with the Honorary Secretary of the Natural History Society, Bombay, who wrote as follows :—

"The explanation lies I believe, in the fact that, although snakes cannot hear *air-vibrations*, they are particularly sensitive to *earth-vibrations*, and can, on a dry soil, feel the footfall of any animal at a considerable distance. The result is that one generally gets only a glimpse of the snake as it is making off, and, as the Irishman said of the flea, '*when you get to where he is, he isn't there.*' Tree-snakes may, however, be easily approached, as they lie coiled up in the branches of a bush. The 'checkered water-snake' (*Tropidonotus quincunciatus*, and the common 'dlaman' (*Ptyas mucosus*) may also constantly be seen lying on rocks 'basking,' or more probably waiting for frogs or small fish. If there is any water between you and the snake it naturally acts as a buffer to the earth-vibrations, and so long as the snake does not see you, you may approach it and talk as loud as you like without disturbing it."

Last week—Xmas—a juggler came round with snakes. I asked him why he stamped his feet or kept dancing when playing his *nagzur* (musical instrument). He replied, venomous snakes cannot hear *air*, but only *earth*, vibrations. I tested his assertion as follows :—

(1.) I placed the *garodiwallah* in front of the cobra playing his *nagzur* and dancing; as usual the snake was charmed.

(2.) I stood motionless in front and placed the juggler at the back of the *Naga*, but *only* playing his horn *without* moving. The snake was quiet, with hood erect and looked *only* at me.

(3.) We reversed positions, but the juggler played his pipe. I stood about three yards behind the snake; there was not a move in it, although I clapped my hands. But when I *moved* the cobra turned round to see "who comes there"?

This is a very interesting subject, and I should much like to have the question ventilated in your columns.

IGATPURI, 28th December 1887.

GHORE PORE.

P S—I have a deaf-mute (a tailor); he seems to *hear*, or rather I should say *feel*, the *earth-vibrations*. On the midday gun being fired he gets up and goes for his *khana*. The gun is about three furlongs from my bungalow. The poor man cannot hear the chiming of my clock above his head.

PROCEEDINGS OF THE SOCIETY'S MONTHLY MEETINGS.

No Meeting was held in October.

PROCEEDINGS OF THE MEETING HELD ON 8TH NOVEMBER 1887.

THE usual monthly meeting of this Society took place on Tuesday, the 8th November, 1887, Mr. G. W. Vidal, C.S., presiding.

The following new members were elected:—Lieut.-Colonel J. Biddulph, Mr. E. L. Cappel, C.S., Mr. Ross Knyvett, Mr. E. Thom, Mr. W. Gaye, Mr. G. Carstensen, Dr. G. W. Cline, Colonel Twenlow, R. E., and Mr. Sitaram V. Sukhtankar.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged receipt of the following contributions to the Society's collections:—

| Contribution. | Description. | Contributor. |
|--|--|--------------------------|
| 1 Whistling Thrush (alive.) | <i>Myiophonus horsfieldi</i> ... | Col Grame. |
| 2 Koels (alive) | <i>Eudynamis honorata</i> | Do. |
| 2 Stuffed Fish..... | From Aden..... | Mr. T. Thorburn. |
| 1 Snake | <i>Dendrophis picta</i> | Mr. H. M. Phipson. |
| 1 Large Sand Piper (alive). | <i>Ægialitis geoffroyi</i> | Mr. G. Ormiston, C.E. |
| 1 Kentish Ringed Plover (alive.) | <i>Ægialitis cantianus</i> | Do. |
| 7 Little Stints (alive)..... | <i>Tringa minuta</i> | Do. |
| 1 Common Sand Piper (alive.) | <i>Tringoides hypoleucos</i> | Do. |
| 1 Snake (alive) | <i>Simotes russellii</i> | Mr. F. Gleadow. |
| A quantity of Snakes and Lizards. | From Surat and Sind | Do. |
| A collection of Shells..... | | Do. |
| A collection of Fossils | From Sind | Do. |
| 2 Dolphins | From Alibag | Mr. W. F. Sinclair, C.S. |
| 1 Hyæna's Skin and Skull. | <i>Hyæna striata</i> | Do. |
| A quantity of Fish, Shells, Crabs and Marine Animals } | From Alibag | Mr. W. F. Sinclair, C.S. |
| 6 Oyster Catchers | <i>Hæmatopus ostralegus</i> | Do. |
| 2 Curlews | <i>Numenius lineatus</i> | Do. |
| A quantity of Turtles' Eggs. | From Alibag | Do. |
| A quantity of Whales' Teeth | | Mr. T. Thorburn. |
| A number of Fossils | | Do. |
| 1 Snake (alive) | <i>Dipsas gokool</i> | Mr. H. O'Connor. |
| 1 Fox (alive) | <i>Vulpes bengalensis</i> | Mr. W. W. Saunders. |
| 1 Snake | <i>Zamenis fasciolatus</i> | Miss Whitcombe. |
| 1 Hare (alive)..... | <i>Lepus nigricollis</i> | Mr. N. V. Mandlik. |
| 1 Snake | <i>Daboia elegans</i> | Mr. C. E. Kane. |
| 1 Chameleon (alive) | <i>Chameleo vulgaris</i> | Mr. J. Hatch. |
| 2 Snakes | <i>Echis carinata</i> and <i>Gongylophis conicus</i> } | Dr. Mallins. |
| 1 Sambur's Head | From Mauritius..... | Capt A. Moore, R. N. |
| 1 Yellow breasted Ground Thrush (alive) | <i>Pitta bengalensis</i> | Mr J. Klingelhofer. |
| 1 Crow | With curiously deformed beak. | Mr. S. P. Leggett. |
| 2 Large Grey Quails | <i>Coturnix communis</i> | Mr. G. Ormiston, C.E. |
| 1 Chameleon (alive) | <i>Chamelio vulgaris</i> | Mr. H. Barrett. |
| 2 African Partridges..... | From Zanzibar | Mr. W. H. Walker. |
| 1 Snake | <i>Echis carinata</i> | Dr. Gaye. |
| Black Buck's Leg | Curiously deformed | Dr. A. K. Stewart. |
| Larvæ and pupæ of | <i>Eryolii taprobana</i> | Mr. J. Davidson, C. S. |
| 1 Grey parrot..... | <i>Psittacus erythacus</i> | Mr. F. C. Limjee. |
| 4 Snakes' Eggs | <i>Tropidonotus stolatus</i> | Mr. H. Bicknell. |
| 1 Yellow breasted Ground Thrush (alive). | <i>Pitta bengalensis</i> | Mr. E. Thom. |
| 1 Snake | <i>Callophis nigrescens</i> | Mr. Shankar Pandit. |
| 1 Snake (alive) | <i>Passcrita mycterizans</i> | Dr. Weir. |
| 1 Hyæna's Skull | <i>Hyæna striata</i> | Mr. H. S. Wise. |
| 1 Crocodile's Skull..... | <i>Crocodylus palustris</i> | Do. |
| 1 Jackal's Skull | <i>Canis aureus</i> | Do. |
| 1 Panther's Skull | <i>Felis pardus</i> | Do. |
| 1 Wild Cat's Skull..... | <i>Felis chaus</i> | Do. |
| 2 Painted Bats | <i>Kerivoula picta</i> | Do. |
| A quantity of Insects..... | From Karwar..... | Do. |
| 1 Python's Skin | <i>Python molurus</i> | Do. |

| Contribution. | Description. | Contributor. |
|---|--|-----------------------|
| 15 Snakes | Ophiophagus elaps, Bungarus arcuatus, Typhlops brahminus, Lycodon aulicus, Python molurus, Hypnale nepa (three), Trimeresurus strigatus, Onychocephalus acutus, Tropidonotus plumbi-color, Sinotes Russellii, Oligodon subgriseus. | Mr. N. S. Wise. |
| A number of Land Crabs and other Crustaceans. | From Karwar | Do. |
| 5 Crocodiles' Eggs | Crocodylus palustris | Do. |
| 1 Lizard..... | Gymnodactylus deccanensis. | Do. |
| A quantity of Scorpions and Centipedes. | From Karwar..... | Do. |
| A quantity of Fungi | From Aurungabad | Mr. Frank Rose. |
| Nest of Alpine Swift | Cypsellus melba | Mr. J. Davidson, C.S. |
| Nest of Palm Swift..... | Cypsellus battassiensis ... | Do. |
| Nest of Crested Tree Swift . | Dendrochelidon coronata... | Do. |
| Several Birds' Eggs | From Yercaud | Mr. W. Mahon Daley. |
| 3 Birds' nests | From Rutnagiri | Mr. H. F. Hatch. |
| 1 Camel's Skull | Camelus dromedarius | Mr. F. G. Lynde. |
| 1 Chameleon..... | Chameleo vulgaris | Mr. Chas. B. Beatty. |

MINOR CONTRIBUTIONS FROM

Mr. Pestonjee J. Jhabvala, Dr. Weir, Miss Barnes, Mr. Chubildas Lulloobhoy, Mr. J. de Souza, Mr. H. Bicknell, Mr. W. F. Melvin, Mr. W. W. Squire, Mr. H. Gauthorn, M. Kaikobad C. Adenwalla, Mr. Tribhovandas Munguldas.

CONTRIBUTIONS TO THE LIBRARY.

Proceedings of the Linnæan Society of N. S. Wales, Vol. II., Part 2.

Proceedings of the Royal Society of Victoria, Vols. XXII., XXIII.

A Catalogue of the Moths of Ceylon, Part I.

A Manual of Comparative Anatomy of the Domestic Quadrupeds; by Dr. N. H. Eduljee Sukhia.

Procès-verbaux des Seances de la Société Royale Malacologique de Belgique, Tome XVI.

Journal of Comparative Medicine and Surgery, New York, October 1887.

Mr. H. S. Wise exhibited a large collection of butterflies, recently made by him in the Canarese Districts, which was greatly admired. A special vote of thanks was passed to Mr. Wise for the numerous contributions to the Society's Museum.

The Honorary Secretary stated that Mr. R. A. Sterndale, who had edited the Society's Journal since 1st January, 1886, was now about to leave Bombay for Madras. This news was received with many expressions of regret from the members present, and a special vote of thanks was passed to Mr. Sterndale for the valuable services he had rendered to the Society since its commencement. Lieut. H. E. Barnes then read a most interesting paper on the Nesting of the Indian Hirundines, which will be found in another part of the number of this Journal.

PROCEEDINGS OF THE MEETING HELD ON 5TH DECEMBER 1887.

The usual monthly meeting of this Society took place on Monday, the 5th December 1887, Dr. D. MacDonald presided, and a large number of members were present.

The following new members were elected:—Mr. A. Elliott, C.S., Captain R. C. Dixon, Mr. H. W. J. Bagnell, C. S. Mr. John M. Heyn, Dr. W. E. Cates, Mr. E. Mitchell, Mr.

A. Leslie, Mr. W. J. B. Clerke, C.E., Mr. J. H. Symington, Rev. J. F. W. Gompertz, Mr. Geo. E. Mason, Major Sawyer, and Dr. Balchandra K. Bhatvadekar.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged receipt of the following contributions to the Society's collections:—

| Contribution. | Description. | Contributor. |
|--|--|---------------------------|
| 1 Snake (alive) | <i>Trimeresurus erythurus</i> , from Moulinein, | Capt. Jones. |
| 1 Cuscus (alive) | <i>Phalangista ursina</i> | Mrs. Potts. |
| 1 Hamadryad or King Cobra (alive). | <i>Ophiophagus elaps</i> (12 feet in length) | Mr. H. T. Ommaney, C.S. |
| 3 Snakes | <i>Trimeresurus anamallensis</i> . | } Hon. Mr. Justice Scott. |
| | <i>Dipsas gokool</i> . | |
| | <i>Cynophis malabaricus</i> | |
| A Collection of Birds' Skins from New Guinea. | | Marchese Giacomo Doria. |
| 1 Snake (alive)..... | <i>Daboia elegans</i> | Mr. J. Brand. |
| 1 Snake (alive)..... | <i>Gongylophis conicus</i> | Mr. H. G. Cowper. |
| 1 Snake (alive) | <i>Silybura macrolepis</i> | Mr. H. Wenden, C.E. |
| 1 Snake (alive) | <i>Hydrophis diadema</i> | Mr. J. M. Cursetjee. |
| 1 Snake (alive) | <i>Daboia elegans</i> | Mr. Bulwant Jayaram. |
| 1 Ostrich's Egg, laid in Bombay. | | Mr. H. W. Barrow. |
| 1 Snake | <i>Daboia elegans</i> | Mr. C. E. Kane. |
| 1 Monitor (stuffed) | <i>Varanus dracæna</i> | Mr. T. Thorburn. |
| 1 Skull of a Hybrid be- tween a wolf and a dog. | | Mr. Frank Rose. |

MINOR CONTRIBUTIONS FROM

Rev. E. S. Hall, Mr. T. Lillbetter, and Mr. G. W. Terry.

CONTRIBUTIONS TO THE LIBRARY.

The Journal of Comparative Medicine and Surgery (27 numbers); the Records of the Geological Survey of India, Vol. XX., Part 3; Bulletin of the California Academy of Science, Vol. II., No. 6; Bulletin of the American Museum of Natural History, Vol. II., No. 1; a File of the *Asiatic* from Mr. R. A. Sterndale; Viaggio di L. Fea in Birmania, from the Marchese Doria. Transaction of the New Zealand Institute, Vol. XIX; Journal of the Asiatic Society of Bengal.

Five handsome markhor heads and three ibex heads, mounted by the Society for Major Pengree, R. A., and collected by him in Cashmere, were exhibited.

Lieut. H. E. Barnes also exhibited some beautiful specimens of Corals from Singapore, collected by Mr. Nelson, s.s. "Lalpoora."

A special vote of thanks was passed to the Marquis Giacomo Doria, the Director of the Museum at Genoa, for his contribution of rare birds' skins from New Guinea.

A vote of thanks was also passed to Mr. H. T. Ommaney, C.S., for his valuable present of a full-grown live specimen of the Hamadryad, or King Cobra (*Ophiophagus elaps*), which was greatly admired by all the members present.

The Honorary Secretary read a statement, received from Mr. Ommaney, containing particulars relative to the capture of the snake in the Canarese jungles on the Hyder Ghat Road.

Mr. W. F. Sinclair, C.S., then gave a most interesting lecture on the "Common Objects of the Sea Shore," which, owing to the lateness of the hour, he was unable to finish. A vote of thanks was voted to Mr. Sinclair, and the meeting then ended.



NEST OF THE CRESTED TREE SWIFT (*DENDROCHELIDON CORONATA*) NATURAL SIZE.
Made of small pieces of bark cemented together with saliva to the dead Branch of a Tree.